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Exploring the Disparities in Agricultural Information Networks: Insights from Tribal and Coastal Farm Women of Odisha in India

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Abstract

Innovation, productivity, and sustainability in farming communities depend on agricultural information networks. For underprivileged groups like tribal and coastal respondents, these networks' differences sometimes inhibit information sharing. This study seeks to examine and assess the differences between the social networks of respondents living in tribal areas and in coastal areas. 240 respondents from Ganjam and Rayagada, Odisha, were sampled using multiple steps. To map farmers' communication pattern, social network analysis (SNA) was used. Respondents from both the area considers the most educated person in family and village and SHG (Self-help group) as their primary source of information but respondents from coastal area are much smart in networking with other information sources as well like using TV, Training, demonstration, field days, other farmers, agriculture department, input dealers etc. Women farmers are less likely to receive information when betweenness centrality is used in targeting, suggesting there are important gender differences, as in tribal area men are likely to talk to the cosmopolite information sources and respondents are generally engaged in the farm activities more whereas in coastal area respondents are actively involved in both farm activities as well as gathering information from different sources.

Keywords: centrality measures, information, information network, SNA, SHG (Self-help group).

1. Introduction

Information aims to improve user comprehension and reduce uncertainty and confusion. Information must be accurate, timely, and relevant to be effective. A "source of information" might be anything seen or experienced (Bates & Marcia J. 2012). Additionally, information sources help meet the needs of various user groups. Many sources of information exist. Men have more access to mobile phones, radios, and other media than women. Thus, they seek farming advice from men (Mgalamadzi et al. (2024). Farm women rarely benefit from financial services (Taylor & Boubakri, 2013). Timely, relevant information that enhances output, revenue, and sustainability is vital to India's rural economies and farm communities. Farm

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women in rural and underdeveloped areas benefit from information networks. Fram women avoid these services due to cultural, economic, legal, and educational hurdles (FAO, 2019). Although their content, size, and structure vary, social networks are universally recognised as a source of social capital (Magnan N et al. 2015). Farmers share and discuss knowledge in their social networks as a resource for production and social engagement. However, information transit within networks depends on both people. Informing aims to reduces confusion and improves comprehension. Effective communication requires accuracy, timeliness, and relevance. Sight or experience can be a "source of information". Information sources benefit different user groups. Many information sources exist. Mobile phones, radios, and other media are more accessible to men. They consult males for farming guidance (Mgalamadzi et al. (2024). Rural women rarely benefit from financial services (Taylor & Boubakri, 2013). Rural India relies on agriculture, and farm communities need timely, relevant information to enhance output, revenue, and sustainability. Information networks assist rural and marginalized farm women improve their lives. Farmers debate knowledge in their social networks for production and socialization. Information transmission in networks depends on social interactions and network structure (Pramila Krishnan MP 2012). Tribal and coastal issues and potential are studied. Tribal and coastal Odisha farmers use different methods and resources. These two regions are appropriate for comparative research because their geography, socioeconomics, and cultures affect farm women's agricultural knowledge utilization. Information networks educate and aid tribal and coastal communities. SHG and agricultural cooperative knowledge, financial inclusion, skill development, and social solidarity benefit women. Policymakers can create region-specific outreach programs that build on strengths and minimize weaknesses by understanding information networks. Agricultural information network research among tribal and coastal respondents in Odisha fills a gap in understanding regional issues and potential for rural women in agriculture. Feminine and male farmer network systems have been hardly studied. No research compares tribal and coastal farming women. Tribal and coastal respondents' information sources, networking habits, and community institutions are examined to inspire future efforts to establish inclusive, effective, and sustainable information systems that empower women to lead rural India's agricultural revolutions.

Review of Literature

A social network negotiates and creates possibilities to meet needs and interests. They promote knowledge transfer, eliminate information asymmetries, and fund agricultural innovations

(Kassie et al. 2013). Technology spread depends on network size, composition, and structure (Tesie et al. 2012). Unique social structure patterns show how humans learn from different sources (Thuo M et al. 2012). Communication and information systems are studied using social network theories and mapping (Nyambo b et al. 2013). According to De Nooy Mrvar and Batagelj (2011), social network analysis (SNA) should focus on interactions, not persons. Centrality measures in social network analysis (SNA) help study social connections' features for a particular element (Gava O et al. 2017). Complex stakeholder interactions reveal interconnectedness, networking, and social exchanges while using sophisticated agriculture technologies (Weyori AE et al. 2017). This phenomenon was explained using social constructivism and social learning theory. In cognition, social constructivism stresses social relationships. Research shows farmers prefer learning from peers and exchanging experiences (Franz N et al. 2010). Communication of knowledge, ideas, and information affects technology adoption. Social media users share information. More network members and information flow boost social learning. In person-level networks differ in their innovation information access and exchange (Reed G et al. 2016). By visualising and assessing relationships between people, groups, and institutions. Social Network Analysis (SNA) can understand complex systems.

Tabular summary of social networks and agricultural information transmission findings from sources given below.

Table 1. Summary of literature use in the study.

Year	Title	Author	Publication	Findings	Knowledge Gap
2020	Climate Change and Women Farmers: A Comparative Analysis	S. Panda	Environmental Studies Journal	Coastal women more vulnerable due to their reliance on climate-sensitive livelihoods.	Limited data on how climate-sensitive vulnerabilities impact the information needs and access methods of tribal versus coastal women.
2021	Mobile Technology for Agricultural Extension in Odisha	T. Kumar	Journal of Mobile Technology	Significant benefits but also challenges in technology adoption.	Few studies on specific barriers to mobile technology adoption among women farmers in diverse rural settings.
2023	The Role of Self-Help Groups in Women's Agricultural Development	P. Pritiprada	Development Studies Review	Showing they can enhance access to information and resources, leading to improved agricultural practices.	Lack of analysis on the comparative effectiveness of SHGs in providing agricultural information in tribal vs. coastal regions.
2024	Digital Literacy and Agricultural Information Access	B. Nanda	Journal of Digital Literacy	Finding that increased digital literacy significantly improves information access and agricultural outcomes.	Insufficient focus on how varying levels of digital literacy impact access and quality of agricultural information among tribal and coastal women.

2. Research Approach and Framework

To determine how tribal and coastal respondents in Odisha receive and use agricultural information, this study explores their agricultural information networks. The research area comprises tribal and coastal areas. Through structured interviews, focus group discussions, and participant observations, respondents from both regions provided data. The research helps create targeted strategies to promote knowledge distribution among Odisha women farmers.

2.1 Study area & sampling:

In Odisha, the research focused on the tribal Rayagada district and the coastal Ganjam district, which have different agricultural settings. Rayagada women farm traditionally with limited access to modern agricultural technologies and resources. In contrast, greater infrastructure and agricultural extension services in Ganjam enable women to participate in varied agricultural enterprises.

Figure 1. Map of Rayagada District.

Figure 2. Map of Ganjam District**.**

The study employed a random sampling method (lottery) approach to select districts i.e., Rayagada & Ganjam. A total of 240 respondents were selected following random sampling method. The research design employed for this study was ex-post facto research design.

2.2 Data Processing and Analysis

Social networks and graph theory were applied to analyse social structures, mapping respondents information networks. The information network topology was surveyed based on research questions. UCINET, an open-source software, visualized networks and calculated Degree, Betweenness, Closeness centrality, and Density (Borgatti et al., 2009), while Netdraw displayed UCINET's binary network (Kolleck, 2013). Data were organized into an n x m matrix, with rows and columns representing persons and sources. Thuo (2012) emphasized that affiliation networks should capture multiple information sources for farm women.

2.3 Social Network Analysis (SNA)

Social Network Analysis (SNA), using graph theory and networks, studies the flow of information, resources, and influence among people, groups, and organizations. It highlights influential actors and nodes within a network. SNA visualizes complex social networks, such

as farm women's information exchange. UCINET and Netdraw are used to compute and display network metrics, including degree (connections), betweenness (information flow control), and closeness centrality (node proximity). Figures 3 and 4 show SNA flowcharts and Odisha's agriculture information network. Sample sizes for SNA vary, from 10-50 for small groups to 50-200 for larger community networks, with over 200 people providing structural insights.

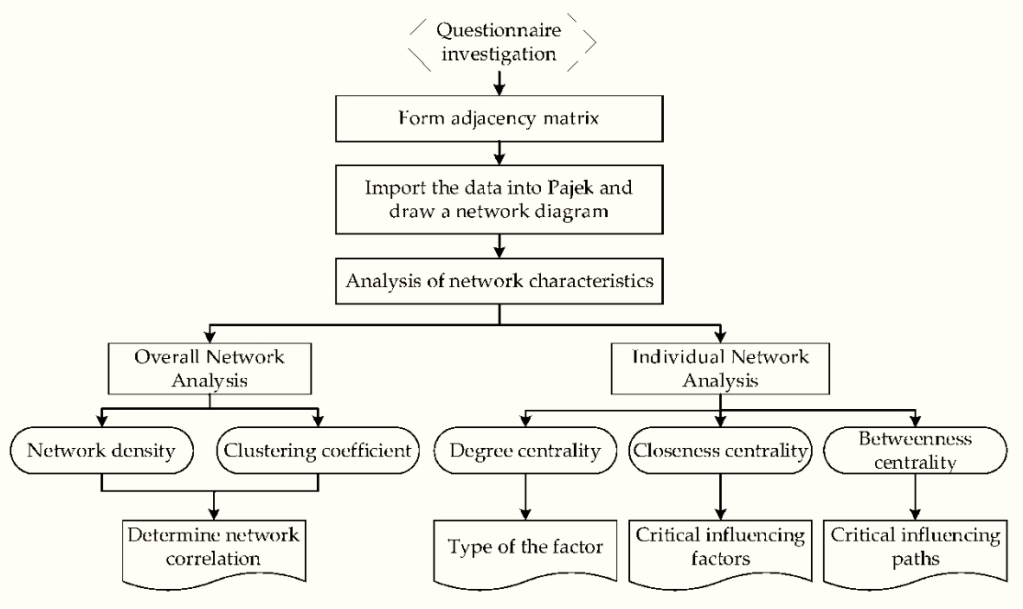


Figure 3. Flowchart for SNA (social networking analysis) using UCINET 6.

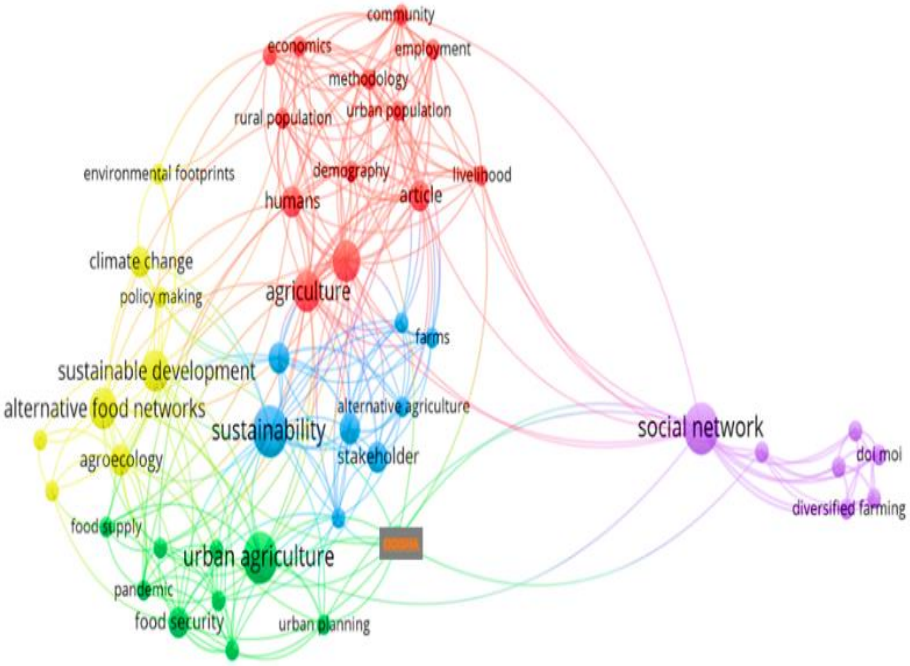


Figure 4. Agriculture Network visualization

3. RESULTS

3.1 Social network structures among the respondents in various study locales

SNA reveals two-mode affiliation networks between farm women and information sources, highlighting the most important, trusted, and valuable sources. Some respondents rely on only one source, while others use multiple (Devi, 2024). Actors with many networks' connections influence others' behaviour. The information networking diagrams for both districts are based on their betweenness centrality values (Nasiri et al., 2022). Gatekeepers, or information sources with high betweenness centrality, play a key role. The networking diagram contains 137 nodes, categorized by information source use, importance, closeness, and value to respondents (Table 2).

Table 2. Information exchange and actors of TRIBAL district respondents (n_1= 120).

S. No	Information source	EXTENT OF USE		IMPORTANCE		CLOSENESS		VALUE	
		Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank
1	Most educated person in family	1.60	2	1.68	1	1.68	1	1.65	2
2	Most educated person in village	1.44	4	1.55	4	1.55	3	1.45	3
3	Neighbors or friends	1.20	6	1.14	6	1.42	4	1.18	5
4	Other farmers (progressive, relative)	1.30	5	1.33	5	1.30	6	1.20	4
5	Input dealers	0.24	11	0.57	3	0.22	14	0.23	17
6	Agriculture department	0.50	7	1.08	7	0.60	9	1.03	6
7	Farmers Call Centre	0	14	0.30	15	0	16	0.35	15
8	Radio	0	15	0.77	12	0.35	11	0.93	9
9	TV	0.27	9	0.94	8	0.37	10	1.00	8
10	News paper	0	17	0.23	17	0	17	0.50	13
11	Training, demonstration & field days	1.63	1	0.91	9	1.37	5	1.02	7
12	Cooperatives society	0	16	0.81	10	0.81	7	0.65	12
13	SHG	1.52	3	1.59	2	1.59	2	1.87	1
14	NGO	0.41	8	0.75	13	0.75	8	0.88	11
15	Leaflets, Folder	0.12	13	0.32	14	0.32	12	0.42	14
16	Internet	0.26	10	0.80	11	0.26	13	0.93	10
17	Others (Micro finance organisation, Bank)	0.16	12	0.24	16	0.10	15	0.30	16

Table 2 shows that most tribal respondents rely primarily on their family's most educated member for information, their second most-used source (Bankapur & Naik, 2018). They attend training, demonstrations, and field days for up-to-date knowledge (Oktarina et al., 2020). The government supports these efforts to enhance food security and livelihoods. Respondents prefer SHGs, which align well with commodity groups, and consult other farmers over publications due to limited formal education. Newspapers are the least used. Key knowledge sources include the family's educated member, SHGs, village contacts, friends, neighbors, and the agricultural department, consistent with Das et al. (2020).

Table 3. Information exchange and actors of COASTAL district respondents (n_2= 120).

S. No	Information source	EXTENT OF USE		IMPORTANCE		CLOSENESS		VALUE	
		Mean Score	Rank	Mean Score	Rank	Mean Score	Rank	Mean Score	Rank
1	Most educated person in family	1.43	3	1.42	4	1.62	3	1.76	1
2	Most educated person in village	1.30	4	1.03	12	1.13	11	1.50	3
3	Neighbors or friends	1.29	5	1.25	8	1.61	4	1.25	8
4	Other farmers (progressive, relative)	1.15	6	1.38	6	1.39	6	1.22	10
5	Input dealers	1.17	7	1.05	11	1.27	8	1.17	11
6	Agriculture department	1.10	9	1.10	10	1.25	9	1.30	7
7	Farmers Call Centre	0.55	16	0.76	15	0.35	15	0.86	14
8	Radio	0.28	17	0.70	17	0.19	17	0.65	17
9	TV	1.58	2	1.58	1	1.77	2	1.60	2
10	News paper	0.71	13	0.71	16	0.35	16	1.14	13
11	Training, demonstration & field days	1.09	10	1.47	3	1.24	10	1.45	4
12	Cooperatives society	0.99	11	1.21	9	1.54	5	1.15	12
13	SHG	1.60	1	1.41	5	1.79	1	1.40	5
14	NGO	0.80	12	0.77	13	0.73	13	0.75	15
15	Leaflets, Folder	0.64	14	1.55	2	0.37	7	0.66	16
16	Internet	1.16	8	0.75	14	1.13	12	1.35	6
17	Others (Micro finance organisation, Bank)	0.56	15	1.33	7	0.52	14	1.23	9

Table 3 shows that coastal respondents trust SHGs over the most educated family member. SHG memberships foster essential partnerships. The agriculture department supports those with primary education, using booklets, training, and online resources. TV, rather than radio, is now the main information and entertainment source. Key information sources include the most educated family member, SHGs, village contacts, neighbours, other farmers, and the agriculture department.

3.2 Centrality measures of various information sources across the study locales

Centrality measurements for information sources in different networks are used to evaluate their influence. Centrality measures a network node's importance. Degree centrality-network node significance. It depends on node connections. Closeness Centrality—assessing each network node's importance. Betweenness Centrality measures the shortest pathways between nodes and which gets frequented most.

3.2.1 Information source and its extent of use by the respondents

Information usage patterns show that tribal respondents prefer trusted sources within their community. Figure 5 illustrates that their network is less dense, with highest reliance on other

farmers (progressive or relatives), followed by the village's most educated person, family's most educated member, training events, SHGs, and neighbors (Table 3).

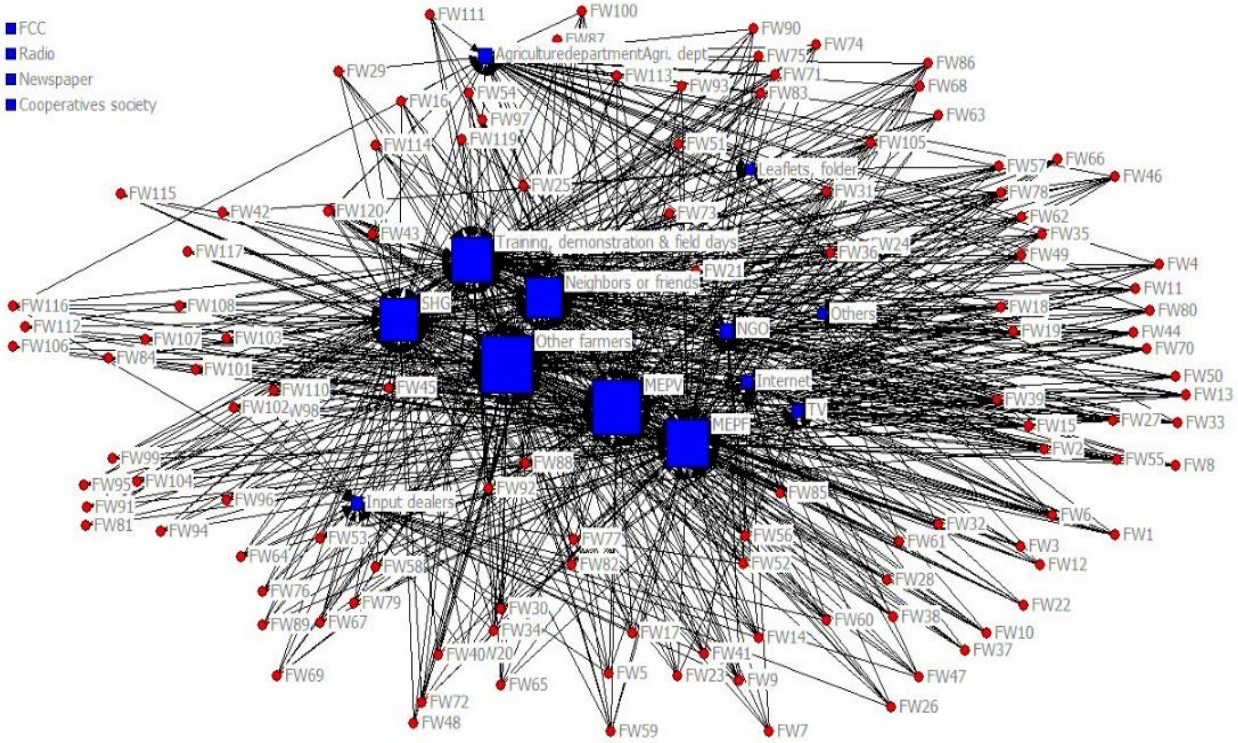
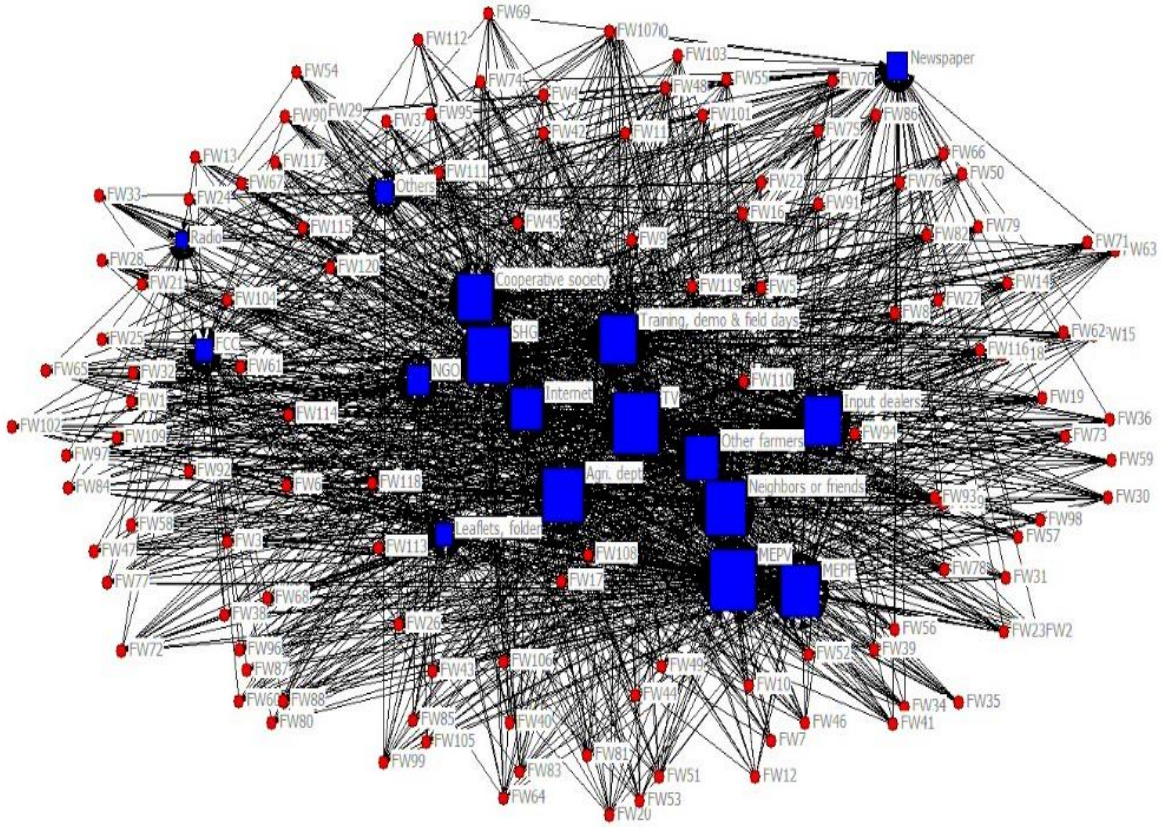


Figure 5. Information network of information source and its extent of use by the TRIBAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

The main dependable information sources for respondents include the agricultural department, TV, input dealers, and the Internet, with NGOs having lower centrality due to limited

177 infrastructure and materials. Leaflets are least used due to literacy limitations (Mago, 2012).



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179 **Figure 6.** Information network of information source and its extent of use by the COASTAL
180 respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

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182 The FCC, radio, newspaper, and cooperative society are disconnected from respondents.
183 With 120 connections, progressive and relative farmers are the most central sources, while only
184 12 rural women use leaflets due to their high closeness centrality. In Figure 6, the coastal district
185 shows a dense network, with TV as a reliable, timely source, followed by SHG, friends, the
186 agriculture department, the most educated family member, training events, input dealers,
187 cooperative society, farmers, and the Internet (Table 4). NGO has lower betweenness centrality
188 than newspapers, leaflets, FCC, and financial sources. The most educated villager has 117
189 connections, while radio, with high closeness centrality, is used by only 30 women.

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Table 4. A comparative table of centrality measures of information source and its extent of use by the respondents (n= 240).

S.No	Information source	Tribal			Coastal		
		Degree	Betweenness	Closeness	Degree	Betweenness	Closeness
1	Most educated person in family	108	1201.558	716.000	108	616.027	176.000
2	Most educated person in village	118	1458.864	696.000	117	741.141	158.000
3	Neighbors or friends	100	972.899	732.000	111	658.683	170.000
4	Other farmers (progressive, relative)	120	1523.575	692.000	96	481.869	200.000
5	Input dealers	23	43.933	890.000	104	570.300	184.000
6	Agriculture department	43	152.875	846.000	108	623.888	176.000
7	Farmers Call Centre	-	-	-	56	152.928	280.000
8	Radio	-	-	-	30	41.747	332.000
9	TV	26	55.755	880.000	118	754.120	156.000
10	News paper	-	-	-	66	213.843	260.000
11	Training, demonstration & field days	108	1174.793	716.000	105	583.758	182.000
12	Cooperatives society	-	-	-	101	534.098	190.000
13	SHG	102	1053.938	728.000	112	674.278	168.000
14	NGO	42	155.190	848.000	73	266.380	246.000
15	Leaflets, Folder	12	10.751	910.000	55	153.540	282.000
16	Internet	22	41.231	888.000	93	450.758	206.000
17	Others (Micro finance organisation, Bank)	15	17.636	904.000	57	152.641	278.000

3.2.2 Importance of information sources as perceived by the respondents

The value of information sources depends on their role in agricultural decision-making. Figure 7 indicates that tribal respondents' networks are less dense, with central connections primarily to the most educated family member, SHG, village, friends, progressive farmers, agriculture department, training events, and TV.

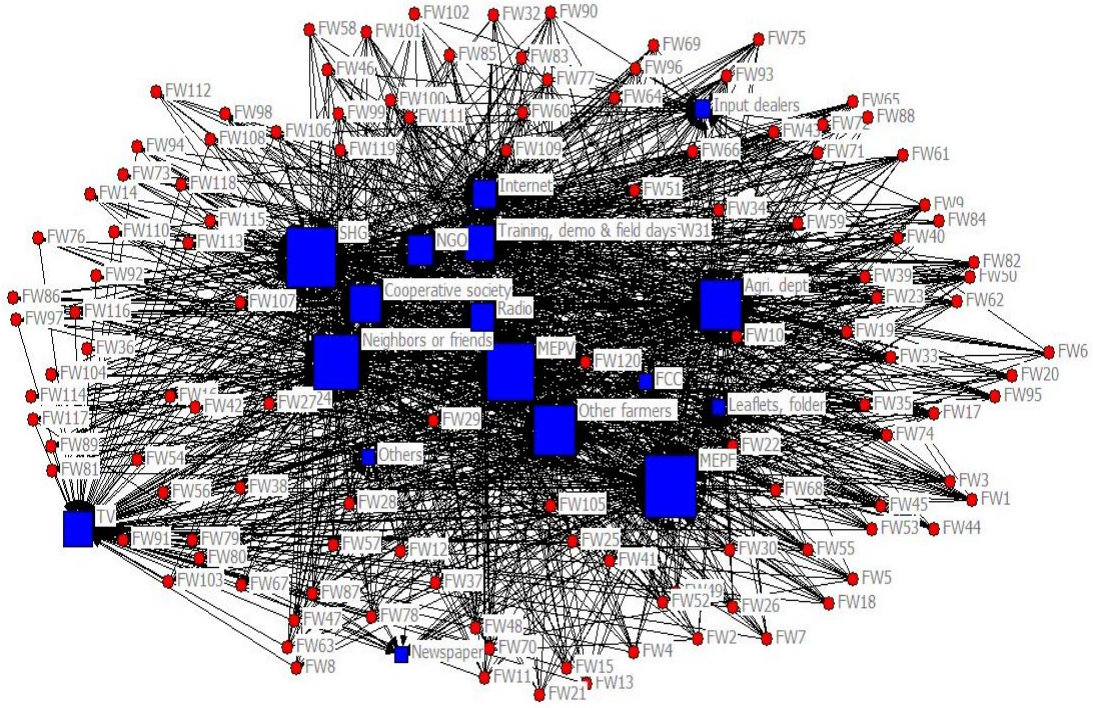

Figure 7. Information network of Importance of information sources perceived by the TRIBAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

Farmer call centers are less central than NGOs, radio, the Internet, input dealers, leaflets, FCC, and other financial sources, while newspapers are the least-used source (Table 5). The family's most educated person has 117 edges, thus 117 respondents get information from them. Newspapers' closeness centrality discourages respondents (20) from using them for agri allied information.

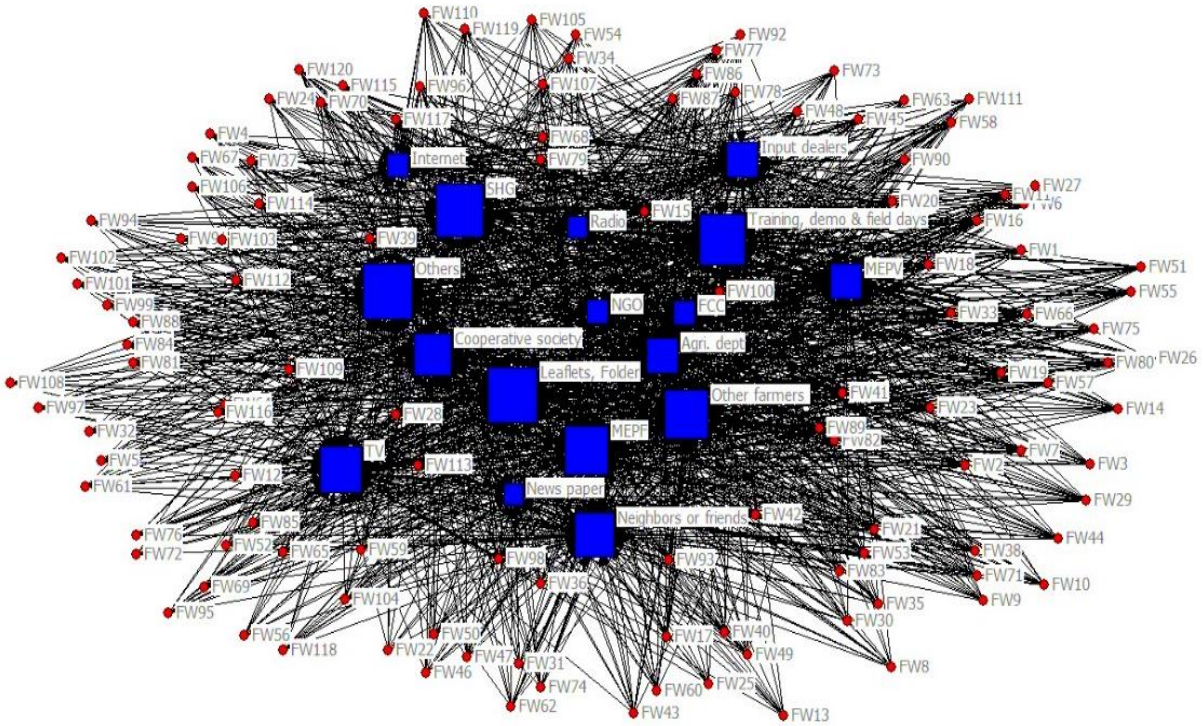

Figure 8. Information network of Importance of information sources perceived by the COASTAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

In Figure 8, coastal district respondents network mainly through leaflets, folders, SHGs, training events, educated family members, progressive farmers, TV, friends, neighbors, cooperative societies, village's most educated, and the agriculture department. FCC has lower betweenness centrality than NGOs, the Internet, and newspapers, with radio being used the least. Leaflets and folders have the highest centrality with 120 connections, while only 61 respondents use newspapers for agri-related information due to its high centrality.

Table 5. A comparative table of centrality measures of importance of information sources perceived by the respondents (n= 240).

S.No	Information source	Tribal			Coastal		
		Degree	Betweenness	Closeness	Degree	Betweenness	Closeness
1	Most educated person in family	117	1014.094	158.000	112	592.986	168.000
2	Most educated person in village	113	921.292	166.000	94	391.687	204.000
3	Neighbors or friends	108	842.484	176.000	106	515.753	180.000
4	Other farmers (progressive, relative)	105	776.194	182.000	112	580.551	168.000
5	Input dealers	42	112.903	308.000	93	380.564	206.000
6	Agriculture department	103	757.499	186.000	92	387.836	208.000
7	Farmers Call Centre	28	46.031	336.000	70	219.510	252.000
8	Radio	70	323.299	252.000	62	164.788	268.000
9	TV	79	435.363	234.000	109	573.963	174.000
10	News paper	20	26.341	352.000	61	165.552	270.000
11	Training, demonstration & field days	84	466.559	224.000	114	630.652	164.000
12	Cooperatives society	85	503.657	222.000	100	478.923	192.000
13	SHG	113	943.894	166.000	117	665.101	158.000
14	NGO	74	347.941	244.000	70	212.043	252.000
15	Leaflets, Folder	32	59.069	328.000	120	700.723	152.000
16	Internet	70	305.986	252.000	66	200.646	260.000
17	Others (Micro finance organization, Bank)	22	32.396	348.000	120	700.723	152.000

3.2.3 Information sources and its closeness in relation to the respondent

Information closeness familiarity and belonging from several knowledge sources is examined in this study. Closeness to the respondent" usually means emotional or psychological intimacy in a relationship or contact. It can include trust, empathy, understanding, and affection.

As shown in Figure 9, tribal respondents information networks are less dense and closely connected to the most educated person in the family or village, Self-Help Groups (SHGs), progressive and relative farmers, training and demonstration events, friends, and cooperative societies (Table 6; Jeeva et al., 2020). Centrality is low for NGOs, agriculture departments, TV, radio, leaflets, input dealers, and the Internet. Microfinance organizations and banks are the least-used information sources.

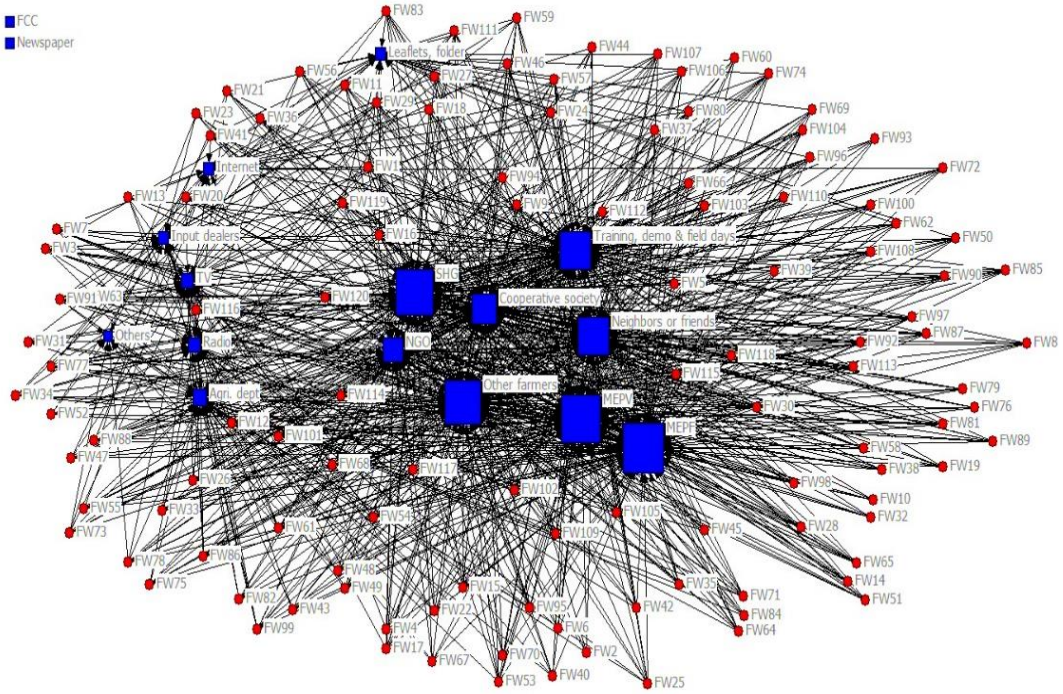

Figure 9. Information network of Information sources and its closeness in relation to the TRIBAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

The Farmer Call Center (FCC) and newspapers are isolated nodes, indicating no connection with respondents. The most educated family member is the most central information source, with 117 connections. The FCC, newspapers, and other financial sources have high closeness centrality due to their lack of engagement with respondents for Agri-allied information.

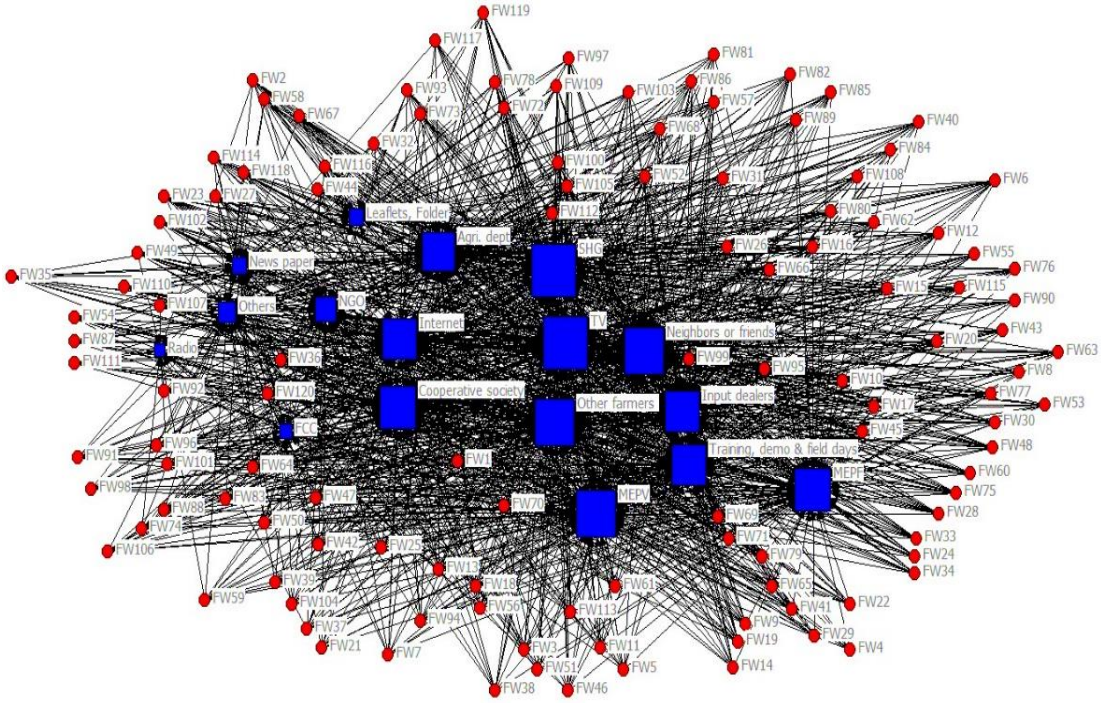

Figure 10. Information network of Information sources and its closeness in relation to the COASTAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

Coastal respondents have close access to various information sources (Figure 10), forming a complex farm knowledge communication network. The closest sources include Self-Help Groups (SHGs) and TV, followed by neighbors or friends, the most educated individuals in their village or family, cooperative societies, and training events (Table 6). Input merchants are less central compared to agriculture departments, NGOs, and other sources. Folders, leaflets, and Farmer Communication Centers (FCC) rank below newspapers in betweenness centrality, while radio is used the least. SHG and TV are the most central sources, each connecting 120 respondents, while fewer than 18 women rely on radio for agri-allied information (Kekulandala et al., 2023).

Table 6. A comparative table of centrality measures of Information sources and its closeness in relation to the respondent (n= 240).

S.No	Information source	Tribal			Coastal		
		Degree	Betweenness	Closeness	Degree	Betweenness	Closeness
1	Most educated person in family	117	1244.782	428.000	105	619.682	182.000
2	Most educated person in village	113	1156.704	436.000	111	672.502	170.000
3	Neighbors or friends	99	840.245	464.000	111	680.058	170.000
4	Other farmers (progressive, relative)	108	1048.649	446.000	112	702.494	168.000
5	Input dealers	24	43.676	614.000	103	556.272	186.000
6	Agriculture department	48	174.587	566.000	102	543.915	188.000
7	Farmers Call Centre	-	-	-	27	36.441	338.000
8	Radio	36	96.754	590.000	18	15.098	356.000
9	TV	36	98.850	590.000	120	813.493	152.000
10	News paper	-	-	-	42	89.988	308.000
11	Training, demonstration & field days	101	901.239	460.000	103	577.439	186.000
12	Cooperatives society	85	612.409	492.000	104	595.203	184.000
13	SHG	113	1146.634	436.000	120	813.493	152.000
14	NGO	74	431.311	514.000	67	225.730	258.000
15	Leaflets, Folder	31	73.775	600.000	39	78.944	314.000
16	Internet	22	39.331	618.000	102	568.116	188.000
17	Others (Micro finance organization, Bank)	12	12.055	638.000	55	150.133	282.000

3.2.4 Information sources and its value as perceived by the respondent

The information value is based on the respondent's judgment of its potential benefit in uncertain times. As shown in Figure 11, tribal respondents information networks are less dense and more prominent within Self-Help Groups (SHGs), followed by other farmers, educated family members, friends, educated villagers, NGOs, the Agriculture department, and training or demonstration events (Table 7). TV is less central than the Internet, radio, cooperative societies, printed materials, newspapers, and financing organizations (Das and Chowdhury 2024),. Input dealers are the least-used information source. SHGs have the highest centrality as information

sources (Mahato, 2023), connecting 120 respondents, while only 20 women access Agri-allied information through input dealers due to their high closeness centrality.

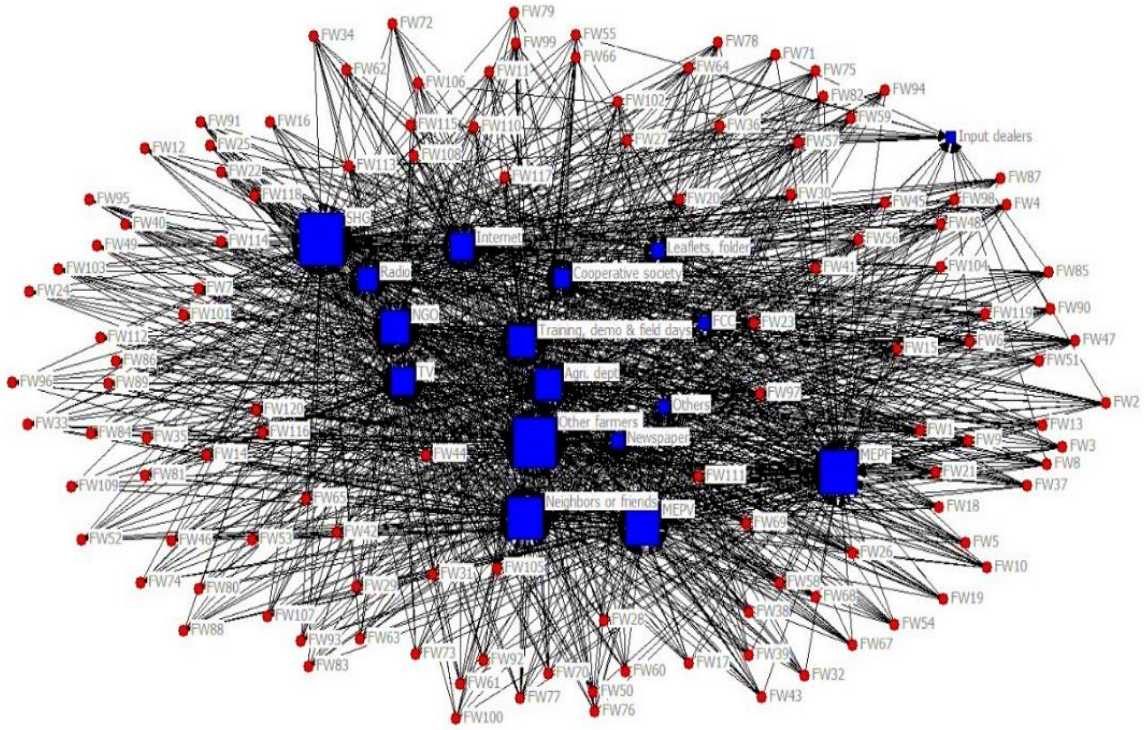

Figure 11. Information network of Information sources and its value in relation to the TRIBAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

As shown in table 7, respondents in the coastal district networked the importance of information sources most densely in the case of the most educational person in the family, followed by SHG, Training, demonstration & field days, Internet, and TV. (Basak & Chowdhury, 2024). Agriculture department, most educated villager, neighbors or friends, input dealers, other farmers (progressive/relative), other information sources, newspaper, cooperative society, FCC, radio, and NGO have relatively low betweenness centrality.

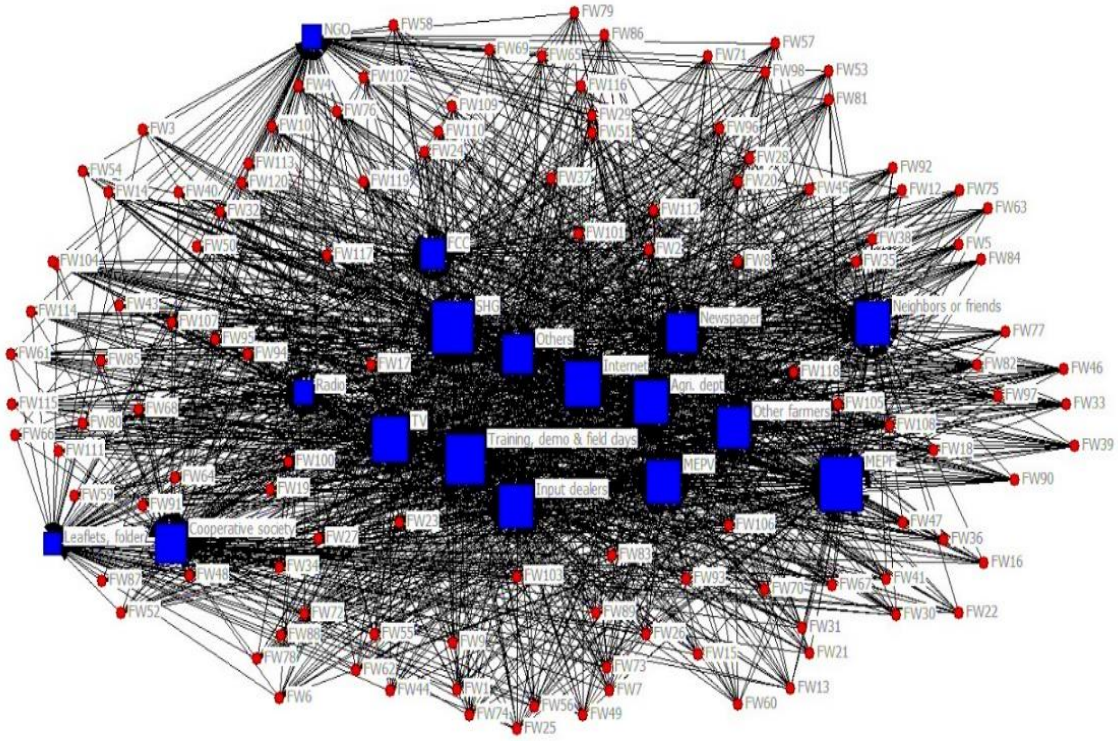

Figure 12. Information network of Information sources and its value in relation to the COASTAL respondents.

Note FW: Farm Women; MEPF: Most educated person in family; MEPV: Most educated person in village; Other farmers: (progressive or relative); Agri. Dept: Agriculture department; FCC: Farmers Call Centre

Respondents utilize leaflets and folders least. The most educated member in the family is the most central information source, with 120 edges, meaning 120 respondents obtain knowledge from it. Leaflets, Folder has the highest closest centrality, thus only 63% of respondents use it for agri-allied information.

Table 7. A comparative table of centrality measures of Information sources and its value in relation to the respondents (n= 240).

S.No	Information source	Tribal			Coastal		
		Degree	Betweenness	Closeness	Degree	Betweenness	Closeness
1	Most educated person in family	110	868.261	172.000	120	655.280	152.000
2	Most educated person in village	101	730.284	190.000	105	492.690	182.000
3	Neighbors or friends	106	806.080	180.000	106	485.250	180.000
4	Other farmers (progressive, relative)	117	1017.181	158.000	105	474.439	182.000
5	Input dealers	20	26.879	352.000	104	482.689	184.000
6	Agriculture department	87	536.987	218.000	106	499.325	180.000
7	Farmers Call Centre	28	53.309	336.000	82	288.100	228.000
8	Radio	69	319.433	254.000	66	186.751	260.000
9	TV	80	454.580	232.000	110	532.674	172.000
10	News paper	42	110.266	308.000	101	442.246	190.000
11	Training, demonstration & field days	86	525.064	220.000	114	585.606	164.000
12	Cooperatives society	56	208.727	280.000	100	430.886	192.000
13	SHG	120	1076.639	152.000	117	615.946	158.000
14	NGO	91	577.909	210.000	65	184.600	262.000
15	Leaflets, Folder	42	117.108	308.000	63	167.232	266.000
16	Internet	80	447.764	232.000	110	539.873	172.000
17	Others (Micro finance organization, Bank)	26	42.528	340.000	100	442.411	192.000

CONCLUSIONS

In Odisha, India, coastal and tribal agricultural women share information through their social networks. The study uses social network analysis to map networks and identify key sources. A trustworthy and efficient respondents information system can be created using the findings. Results suggest that coastal respondents use SHGs and tribal respondents consult the most educated family member. The study also reveals how social networks affect respondents' knowledge transfer. Using SHGs for collective participation, improving women's information networks, minimizing mobile phone use to reach women farmers owing to ownership and phone literacy concerns, and developing community information centers can bridge the gender gap in information transmission (Mahato, 2023). SNA enhances agricultural extension, gender equity, and rural sustainable development.

This study's focus on Odisha may limit its applicability to other cultural, socioeconomic, and agricultural situations. The study also uses Social Network Analysis (SNA) to understand network structure and key participants, however it may not fully capture qualitative components of information exchange, such as knowledge depth or source credibility.

Similar research and activities in other countries can use Self-Help Groups (SHGs), improve women's information networks, reduce mobile phone use, and create community information centers. This research affects countries and areas confronting similar issues in agricultural

information transmission, gender equality, Comparative Analysis in Different Cultural Contexts, Policy Formation and Extension Services, and Gender Equality.

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