



“Organic Farming Awareness Among Primary Agricultural Producers: A Review of Current Research and Future Directions”

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Abstract

Organic farming has attracted increasing policy and scholarly attention because of its associations with environmental protection, soil health, food quality, human health, and potentially improved farm incomes. However, the expansion of organic agriculture depends not only on consumer demand or policy ambition but also on the awareness, perceptions, capabilities, and institutional conditions of primary agricultural producers. This narrative and thematic review synthesizes supplied research concerning farmers' knowledge of organic practices, certification and standards, perceived benefits, adoption motivations, barriers, training needs, and extension support. The reviewed evidence indicates that producer awareness is multidimensional and uneven. Farmers may understand the general health and environmental rationale for organic agriculture while remaining uncertain about production techniques, certification procedures, market requirements, input availability, and the economic implications of conversion. Across the literature, positive attitudes toward organic farming are common, but favorable perceptions do not consistently result in adoption. This awareness-adoption gap is associated with perceived production risk, low technical capacity, inadequate market opportunities, certification costs, weak institutional support, insufficient credit, and uncertainty during the conversion period. Training, extension, farmer organizations, information access, education, land ownership, market premiums, and supportive public policies are recurrent drivers, although their influence varies by context. Evidence from randomized training research provides stronger support for the causal effect of intensive information provision than the predominantly observational survey literature. Future research should use longitudinal and experimental designs, measure certification-specific knowledge more precisely, examine gender and social differentiation, assess digital extension, and connect awareness with actual conversion and sustained organic management. Organic farming awareness should therefore be understood as a necessary but insufficient condition for adoption, requiring integration with viable markets, resources, institutions, and locally appropriate support systems.

Keywords: organic farming; producer awareness; farmer adoption; certification knowledge; agricultural extension; smallholders

1. Introduction

Organic farming has become an important subject in agricultural policy, rural development, and sustainability research. The supplied literature presents organic agriculture as a production system associated with reduced reliance on synthetic inputs, environmental protection, soil improvement, food quality, and human health. These perceived benefits are among the principal reasons that farmers, governments, development organizations, and consumers have shown interest in organic production. At the same time, the literature indicates that the expansion of organic agriculture remains uneven. Farmers may express support for organic principles without converting their farms, may practice some organic techniques without formal certification, or may abandon organic production when market, technical, or institutional conditions are unfavorable. (Bottazzi et al., 2023; Janjhua et al., 2019)

The awareness of primary agricultural producers is particularly important because farmers occupy the point at which organic standards, technical recommendations, market incentives, and policy programs must be translated into day-to-day production decisions. Awareness includes more than recognition of the word "organic" or general agreement with its environmental and health benefits. It involves knowledge of production practices, input management, pest and weed control, soil fertility, certification requirements, standards, record keeping, market channels, price premiums, conversion periods, and the risks and benefits of organic management. Evidence from India shows that farmers can possess favorable beliefs about organic farming while remaining unfamiliar with certification and standards. (Singh & George, 2012) Evidence from the Delmarva Peninsula in the United States similarly indicates that farmers may know about production costs, marketing, and general organic practices but lack knowledge of certified organic production. (Marsh et al., 2016)

The problem addressed in this review is therefore not simply whether farmers are aware of organic farming. Rather, it concerns the content, quality, sources, and consequences of that awareness. The literature reports substantial variation between and within countries in farmers' knowledge and perceptions. In some contexts, organic and conventional farmers have similarly favorable attitudes or high levels of knowledge, while in others organic farmers demonstrate more positive perceptions concerning price, health, environmental benefits, or certification. (Nalubwama et al., 2024;

Sujianto et al., 2022) Positive attitudes also coexist with limited adoption. Research in northern Senegal found highly favorable attitudes among both organic and conventional farmers, yet very low adoption because farmers perceived insufficient ability, market opportunity, and institutional support. (Bottazzi et al., 2023)

This review has four objectives. First, it defines producer awareness and distinguishes it from attitudes, perceptions, intentions, and actual adoption. Second, it synthesizes evidence concerning levels and content of awareness among smallholders and farmers. Third, it examines drivers and barriers connecting awareness with organic adoption, including training, extension, education, gender, market access, certification, and health and environmental motivations. Fourth, it identifies methodological and substantive gaps that should guide future research and policy design.

V The paper is organized as follows. Section 2 explains the narrative and thematic review methodology. Section 3 develops a conceptual framework for understanding awareness and its relationship with perception and/adbption WS Section 4 presents the thematic synthesis, including regional variation. Section 5 discusses the strength and limitations Go to Settings to activate Wi of the evidence. Section 6 proposes future research directions, and Section 7 concludes.

2. Methodology

This paper uses a narrative and thematic literature review rather than a formal systematic review with a reproducible database search, screening count, or meta-analysis. The supplied corpus was examined for studies addressing organic farming awareness, knowledge, perceptions, attitudes, adoption, conversion, certification, training, extension, information access, and barriers among primary agricultural producers. The corpus includes empirical surveys, mixed-methods studies, qualitative interviews, reviews of adoption research, a randomized training study, and research on training needs. The review does not claim to identify or count all studies published on the subject.

The synthesis proceeded through thematic reading of the supplied papers. First, studies were examined for how they conceptualized or measured awareness, knowledge, perception, attitude, and practice. Second, reported findings were grouped under recurring themes:

levels and content of awareness; relationships between awareness, perceptions, and adoption; training and extension; demographic and social drivers; market and economic motivations; certification; institutional constraints; and regional variation. Third, findings were compared across producer groups, countries, and research designs. Particular attention was given to distinctions between organic and conventional farmers, between willingness to adopt and actual adoption, and between general organic knowledge and certification-specific knowledge.

The corpus contains both primary studies and review articles. The systematic review of adoption factors published in 2021 synthesized 50 studies and organized evidence around farmer and household characteristics, psychosocial factors, farming factors, and supportive factors. (Sapbamrer & Thammachai, 2021) The global review published in 2024 examined the broader adoption literature and emphasized differences in market maturity, productivity, geography, and research methods. (Möhring et al., 2024) These reviews are used as secondary syntheses, while country-level studies are used to illustrate how awareness and adoption operate in specific contexts.

The evidence was also interpreted according to research design. Cross-sectional surveys are useful for identifying associations between awareness, attitudes, farmer characteristics, and adoption, but they generally cannot establish temporal or causal relationships. Qualitative interviews provide contextual insight into farmers' information sources, perceived problems, and interpretations of extension, although they are not intended to estimate prevalence. Experimental evidence is given particular analytical weight where available. The Indonesian randomized training study provides stronger evidence concerning the effects of information provision on knowledge, perceptions, and organic input use than observational studies alone. (Grimm & Luck, 2020) Nevertheless, its findings should not be assumed to apply uniformly across production systems or countries.

The review follows the citation requirements of the supplied corpus and does not introduce external studies, country statistics, or unsupported numerical estimates. Where the literature reports mixed findings, the review presents those disagreements rather than treating one result as universally applicable.

3. Conceptual Framework

3.1 Defining producer awareness

In this review, producer awareness refers to the extent to which farmers possess and can use information relevant to organic agriculture. It has at least five connected dimensions. The first is production knowledge, including knowledge of organic soil fertility management, biological or non-synthetic pest control, weed management, organic inputs, crop rotation, and other farm practices. The second is certification and standards knowledge, including awareness of eligibility requirements, conversion periods, inspection, record keeping, labeling, and applicable standards. The third is benefit and risk awareness, including perceived effects on health, soil, biodiversity, yields, production costs, climate resilience, and farm income. The fourth is market knowledge, including information about buyers, price premiums, marketing structures, consumer demand, and the distinction between certified and non-certified products. The fifth is institutional awareness, meaning knowledge of available extension, training, credit, subsidies, farmer associations, input suppliers, and public programs.

This multidimensional definition is supported by evidence that farmers often possess some forms of knowledge while lacking others. In Uttarakhand, farmers practicing organic agriculture understood basic aspects of organic farming but were not fully aware of certification and standards. (Singh & George, 2012) On the Delmarva Peninsula, at least some farmers reported knowledge of costs, marketing, and production practices, while many lacked knowledge of certified organic production. (Marsh et al., 2016) In Indonesia, organic rice farmers continued to report shortages of organic fertilizer resources and certification, despite strong positive beliefs about organic farming's future. (Sujiyanto et al., 2022)

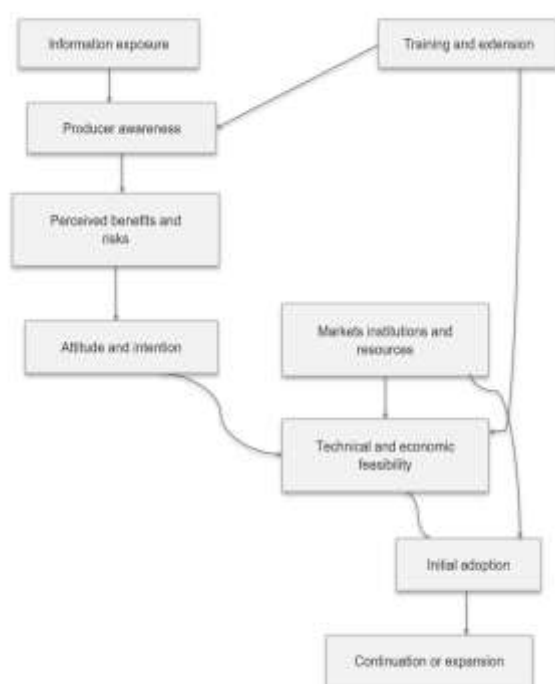
Awareness should therefore not be treated as a single binary condition. A farmer may be highly aware of environmental advantages but poorly informed about certification. Another farmer may understand organic input preparation but lack access to buyers. A third may know the technical requirements but regard conversion as economically too risky. Such distinctions are essential when designing extension and policy interventions.

3.2 Awareness, perception, attitude, intention, and adoption

Awareness is analytically distinct from perception and attitude. Awareness concerns what farmers know or recognize; perception concerns how they interpret the consequences, feasibility, and value of organic agriculture; attitude refers to the overall favorable or unfavorable evaluation of organic farming. The distinction is visible in the Bangladesh KAP study, where most respondents had medium knowledge and highly favorable attitudes, but actual organic practices remained relatively low. (Islam & Islam, 2020) Similarly, the Senegal study found positive attitudes among both conventional and organic farmers, but low adoption because perceived ability and opportunity were insufficient. (Bottazzi et al., 2023)

Adoption refers to the decision to begin, continue, or expand organic farming practices. It may involve complete farm conversion, partial adoption, use of particular organic inputs, or allocation of a larger share of land to organic production. These forms should not be conflated. The Nigerian study, for example, examined both the likelihood of adopting organic farming and the share of land devoted to it, finding that awareness was associated with both outcomes. (Ume et al., 2023) The Ghanaian study likewise distinguished adoption from the amount of total cropland allocated to organic vegetable production. (Boateng et al., 2023)

A useful conceptual sequence is:



This sequence is not strictly linear. Awareness can influence perceptions, but perceptions are also shaped by farming experience, social networks, market conditions, and institutional support. Adoption may generate new knowledge and alter perceptions, while failed experiences may reduce enthusiasm. The Uganda study illustrates this complexity: knowledge and perception were positively related among non-organic farmers but negatively related among organic farmers, suggesting that the relationship may depend on experience and the specific meaning assigned to knowledge. (Nalubwama et al., 2024)

3.3 The awareness-adoption gap

The awareness-adoption gap refers to situations in which farmers recognize the benefits of organic farming or express favorable attitudes but do not adopt, sustain, or expand organic practices. The gap may result from an inability to implement what is known, limited access to inputs and markets, certification costs, perceived yield reductions, insufficient labor, or concerns about transition risks. The Senegal framework describes these conditions through attitude, ability, opportunity, and legitimacy. Positive attitudes alone were not enough when farmers lacked knowledge, tools, organic inputs, markets, and institutional support. (Bottazzi et al., 2023)

The framework used in this review consequently treats awareness as a necessary but insufficient component of adoption. Conversion requires the interaction of knowledge with technical capacity, economic incentives, social legitimacy, institutional support, and access to viable value chains. This perspective avoids both an information-deficit explanation, which assumes that farmers fail to adopt only because they lack knowledge, and a purely economic explanation, which overlooks the role of beliefs, social networks, and learning.

4. Current State of Research

4.1 Levels and content of awareness among producers

The literature suggests that awareness among producers is generally partial, differentiated, and context-dependent. Farmers commonly recognize broad claims about organic farming, especially its associations with health, environmental protection, food safety, and premium prices. However, knowledge of the practical

and regulatory requirements of organic production is often less complete. In Uttarakhand, organic farmers expressed favorable beliefs and basic awareness, but lacked comprehensive knowledge of certification and standards. (Singh & George, 2012) In the Delmarva Peninsula, fewer than one-third of surveyed farmers grew both organic and inorganic crops, and fewer than one-tenth grew only organic crops; although many had some knowledge of organic production costs, marketing, and practices, nearly half lacked knowledge concerning certified organic production. (Marsh et al., 2016)

The content of awareness also differs between organic and conventional farmers. The Indonesian rice study found significant differences between organic and conventional farmers in perceptions of production, quality, health and safety, market price, environmental concern, and certification. Organic farmers generally reported more positive perceptions. (Sujianto et al., 2022) In Uganda, however, both organic and non-organic pineapple farmers demonstrated high knowledge and favorable perceptions, with no significant difference in overall knowledge and perceptions. Differences appeared in specific areas, including perceived health and nutritional benefits and market access. (Nalubwama et al., 2024) These findings caution against assuming that organic status automatically indicates higher general awareness.

Research also indicates that farmers' knowledge may be practice-specific. The Bangladesh study reported medium knowledge among most farmers, a highly favorable attitude, and low levels of practice. Cow-dung application was the most commonly practiced activity, whereas regular soil testing was least practiced among the listed practices. (Islam & Islam, 2020) This pattern suggests that awareness may be stronger for familiar, low-cost, locally available practices than for activities requiring specialized knowledge, testing, documentation, or external inputs.

Certification is one of the clearest areas of incomplete awareness. Farmers may understand organic farming as a set of production practices but not know the formal requirements for accessing certified markets. The Uttarakhand and Delmarva studies both identify this distinction. (Marsh et al., 2016; Singh & George, 2012) Indonesian organic rice farmers also reported strong belief in organic farming while continuing to face shortages of certification and organic fertilizer resources. (Sujianto et al., 2022) In Nigeria, the relationship between awareness and adoption was accompanied by a

recommendation that certification policy should be designed in ways that do not undermine smallholder agency. (Ume et al., 2023)

4.2 Awareness, perception, and adoption linkages

The evidence generally supports a positive association between awareness and adoption, but it does not support a simple or universal relationship. In southeastern Nigeria, farmers who knew what organic farming entailed were more likely to adopt and devoted a greater share of land to organic production than less-aware farmers. The same study found that organized organic marketing and price premiums improved adoption outcomes. (Ume et al., 2023) In Indonesia, a randomized three-day hands-on training intervention increased knowledge, perceptions, and use of organic inputs, offering experimental evidence that information and practical learning can affect behavior. (Grimm & Luck, 2020)

Nevertheless, awareness does not remove structural constraints. The Senegal study is especially important because it found favorable attitudes among both conventional and organic smallholders but very low adoption and substantial abandonment of organic practices. The decisive constraints were perceived ability and opportunity, including difficulty obtaining organic inputs, knowledge, and tools, as well as the absence of markets and institutional support. (Bottazzi et al., 2023) In this context, additional promotion directed at farmers who were already convinced was likely to be less effective than system-level interventions.

The Bangladesh KAP study provides a similar indication of a gap between attitude and practice. Most respondents had highly favorable attitudes, but practice levels were low. (Islam & Islam, 2020) In India, conventional farmers identified production and marketing barriers as major constraints, even though some were interested in future conversion because of lower production costs, price premiums, or health benefits. (Panneerselvam et al., 2011) These findings indicate that intention is conditional on expected economic and technical feasibility.

Adoption is also dynamic. Organic farmers in India reported that years under conversion were associated with reduced input costs in all three study states, while income and yield effects varied by state and conversion stage. Farms in a post-conversion period experienced yield increases in Madhya Pradesh and Uttarakhand,

whereas farms still in conversion in Tamil Nadu experienced yield reduction. (Panneerselvam et al., 2011) Such variation may shape awareness retrospectively: farmers learn from conversion, revise expectations, and distinguish temporary transition costs from longer-term outcomes.

The adoption literature broadly reinforces this multidimensional interpretation. The 2021 review identified farmer and household characteristics, psychological and social factors, farm conditions, training, information acquisition, extension contacts, associations, technology support, and government resources as relevant influences. (Sapbamrer & Thammachai, 2021) The 2024 global review further argues that recommended policies should vary according to organic market maturity and agricultural productivity. (Möhring et al., 2024) Awareness is therefore most likely to translate into adoption when it is combined with supportive conditions.

4.3 Drivers of awareness and adoption

4.3.1 Training and extension

Training is one of the most consistently identified mechanisms for improving awareness and adoption. The Indonesian randomized experiment found that intensive, hands-on training produced positive and statistically significant effects on knowledge, perceptions, and use of organic inputs. (Grimm & Luck, 2020) The finding is important because it moves beyond the common assumption that information matters by providing experimental evidence that a specific training intervention can influence organic practices.

Training needs are not uniform. A study of mango farmers in Tamil Nadu found strong preferences for training in the preparation of Panchakavya and vermicompost and the use of biological insecticides and fungicides. Farmers preferred practical, peripatetic training, often near their own villages, with a duration of several days and delivery by agricultural scientists. (Elakkiya & Karthikeyan, 2020) These preferences suggest that training design should reflect local production systems, farmer schedules, and the practical tasks required during conversion.

Extension services, however, do not always function as farmers' primary information source. Interviews with organic farmers in central Pennsylvania found that other organic farmers and organic farming organizations were

more frequently used than extension services. Farmers relied on social capital to identify solutions to insect, weed, weather, certification, and production challenges. (Alotaibi et al., 2021) This result does not imply that extension is unimportant; rather, it indicates that formal extension must be credible, relevant, and connected to farmer networks.

Evidence from Uganda similarly links perceptions with education, information sources, group membership, and extension services, while farmer knowledge was influenced by information sources and farming experience. (Nalubwama et al., 2024) The 2021 adoption review also identifies training, information acquisition, extension contact, farm associations, and technology support as recurring supportive factors. (Sapbamrer & Thammachai, 2021) Taken together, the findings favor pluralistic extension systems that combine formal advisory services with peer learning, farmer organizations, demonstrations, and practical training.

4.3.2 Education, experience, gender, and social organization

Education and experience appear frequently in the adoption literature, but their effects are not identical across settings. The global and systematic reviews identify education, gender, age, farm ownership, off-farm income, experience, and association membership among the farmer and household factors associated with adoption. (Möhring et al., 2024; Sapbamrer & Thammachai, 2021) In Uganda, education influenced perceptions, while farming experience influenced knowledge. (Nalubwama et al., 2024) In Ghana, sex, age, education, extension visits, association membership, production timing, and marketing information affected adoption of organic vegetable production, while age, land ownership, economic status, and association membership influenced the share of land allocated to organic production. (Boateng et al., 2023)

The role of gender requires careful interpretation. The 2021 review identifies female farmers as among the groups with high potential for adoption, but such findings should not be interpreted as evidence that gender alone determines adoption. (Sapbamrer & Thammachai, 2021) Gender may operate through access to land, training, finance, labor, information, and farmer organizations. The supplied literature does not

consistently disaggregate these mechanisms, making gender-sensitive analysis an important future priority.

Farmer organizations can contribute to awareness by circulating experience and information, while also improving bargaining power and market coordination. (Sapbamrer & Thammachai, 2021) In Ghana, association membership was associated with both adoption and the proportion of cropland devoted to organic production. (Boateng et al., 2023) In Senegal, support for grassroots farmer organizations was proposed as part of a broader strategy to address systemic barriers. (Bottazzi et al., 2023) Social organization therefore appears to connect awareness with collective access to inputs, certification, buyers, and technical advice.

4.3.3 Economic, health, and environmental motivations

Farmers' motivations are diverse. Indian farmers identified low production costs, price premiums, and health benefits as reasons for possible conversion, while organic farmers placed greater emphasis on health, environmental, and production factors when institutional support was available. (Panneerselvam et al., 2011) Indonesian organic rice farmers associated organic production with higher prices and an organic farming lifestyle, while conventional farmers perceived lower yields, risk aversion, and lack of cash compensation as important concerns. (Sujianto et al., 2022)

Environmental and health motivations may create favorable attitudes, but economic viability often determines whether farmers can sustain adoption. In Turkey, perceptions of economic sustainability positively influenced implementation, whereas perceptions of barriers had a negative effect. Farmers identified certification costs, limited credit, and difficulty accessing organic inputs as prominent obstacles, and requested purchase guarantees, financial support during certification, and input subsidies. (ETİ, 2025) In Poland, farmers attached greater importance to economic than non-economic barriers, especially low yields, low production volumes, production risk, market conditions, and unstable regulations. (Łuczka & Kalinowski, 2020)

The evidence therefore suggests that health and environmental awareness is significant but insufficient. Producers are likely to evaluate organic farming through a combined lens of values, expected returns, risk, labor requirements, and institutional credibility. This is

consistent with the Senegal framework, which emphasizes attitude, ability, opportunity, and legitimacy rather than motivation alone. (Bottazzi et al., 2023)

4.4 Barriers to awareness and adoption

4.4.1 Certification costs, complexity, and standards

Certification is a recurrent barrier linking awareness to market participation. Farmers may not know the relevant standards, may find certification procedures difficult to understand, or may be unable to bear inspection and compliance costs. The Uttarakhand study found incomplete awareness of certification and standards, while the Delmarva study identified the time required for certification as a major reason farmers did not grow organic crops. (Marsh et al., 2016; Singh & George, 2012) Indonesian farmers also reported certification constraints, and Turkish farmers identified certification costs among their most common challenges. (ETİ, 2025; Sujianto et al., 2022)

Certification barriers have both informational and material dimensions. Information is necessary to understand requirements, but knowledge alone does not make certification affordable or accessible. The Nigerian study consequently calls for certification approaches that support smallholders without undermining farmer agency. (Ume et al., 2023) The Senegal study proposes participatory certification and alternative food networks as possible responses to formal certification and market constraints. (Bottazzi et al., 2023)

4.4.2 Information gaps and technical uncertainty

Information gaps extend beyond definitions and standards. Farmers may lack knowledge about soil fertility, biological pest management, organic inputs, crop protection, record keeping, and transition planning. The Indian study identifies lack of knowledge as a barrier to conversion, while the Iranian review reports difficulties accessing reliable technical information. (Panneerselvam et al., 2011; Soltani et al., 2013) In Pennsylvania, farmers faced insect, weed, and weather-related challenges and relied heavily on peer networks rather than extension. (Alotaibi et al., 2021)

Technical uncertainty is especially consequential because farmers must manage biological and climatic risks without relying on conventional input regimes. The literature does not suggest that training eliminates these risks. Rather, effective training may improve farmers' ability to recognize, prevent, and manage them.

The Indonesian experiment indicates that practical training can increase the use of organic inputs, but broader research is needed to establish whether such effects persist and lead to complete or sustained conversion. (Grimm & Luck, 2020)

4.4.3 Institutional and policy barriers

Institutional support affects both awareness and the feasibility of adoption. Indian conventional farmers cited institutional support as a barrier, and the study recommended compensation for yield losses during conversion and price premiums. (Panneerselvam et al., 2011) The Indian adoption study found that marketing and government policy were crucial across farmer categories and argued that government support is especially important where small and marginal farmers predominate. (Azam & Shaheen, 2019)

Policy instability can itself become a source of uncertainty. The Polish case study identified unstable organic regulations and weak communication from regulatory institutions as important barriers. Many farmers viewed financial support as necessary for continuing organic production, while some intended to discontinue. (Łuczka & Kalinowski, 2020) In Turkey, farmers similarly sought financial assistance during certification, credit, and input subsidies. (ETİ, 2025)

These findings challenge approaches that treat awareness campaigns as sufficient. Where institutions do not provide predictable rules, transition support, certification assistance, or market coordination, awareness may increase perceived barriers rather than adoption. Better information can make farmers more conscious of the costs and risks they would face.

4.4.4 Market access and socio-economic constraints

Markets are central to the awareness-adoption relationship. Farmers need information about buyers and prices, but they also need actual market channels capable of rewarding organic production. In Nigeria, organized marketing structures and price premiums were positively associated with adoption and land allocation. (Ume et al., 2023) In Ghana, access to marketing information was a significant factor influencing adoption. (Boateng et al., 2023) In India, production and marketing barriers were central concerns among conventional farmers. (Panneerselvam et al., 2011)

Economic constraints include limited credit, lack of land ownership, insufficient off-farm income, input costs,

and low production volumes. The adoption review identifies farm ownership, off-farm income, production cost, and supportive resources as relevant factors. (Sapbamrer & Thammachai, 2021) Lease farmers in India were especially concerned about the economic viability of organic farming. (Azam & Shaheen, 2019) In Poland, low yields and production volumes were interpreted as sources of risk. (Łuczka & Kalinowski, 2020)

Smallholders face a particularly complex challenge because certification, record keeping, input procurement, and market access may involve fixed costs that are difficult to spread across limited production. The evidence from Senegal, Nigeria, India, and Ghana indicates that collective organization and targeted institutional support may be more effective than individual farmer promotion alone. (Boateng et al., 2023; Bottazzi et al., 2023; Ume et al., 2023)

4.5 Regional and contextual variation

The supplied studies demonstrate that producer awareness and adoption cannot be understood independently of national and local context. In India, awareness and perceptions vary among Tamil Nadu, Madhya Pradesh, and Uttarakhand. Motivations include lower input costs, price premiums, and health benefits, while concerns involve yields, pest control, marketing, knowledge, and institutional support. (Panneerselvam et al., 2011) Uttarakhand-specific research further shows that farmers practicing organic agriculture may still lack detailed knowledge of certification and standards. (Singh & George, 2012)

In Uganda, pineapple farmers in Luwero and Kayunga displayed high knowledge and favorable perceptions among both organic and non-organic groups. However, differences in health, nutrition, and market perceptions indicate that awareness is not uniform across content domains. Education, information sources, group membership, extension, and farming experience shaped knowledge and perceptions. (Nalubwama et al., 2024)

Indonesia illustrates the importance of both perceived incentives and intensive training. Organic rice farmers viewed price and lifestyle benefits positively, but faced shortages of organic fertilizer resources and certification. The experimental training evidence indicates that information provision can improve knowledge, perceptions, and organic input use. (Grimm & Luck, 2020; Sujianto et al., 2022) These findings suggest that

awareness valuable when combined with input and market systems. interventions may be

In Senegal, favorable attitudes coexisted with very low adoption because farmers perceived low ability and limited opportunity. This is a particularly clear illustration of the awareness-adoption gap in a smallholder context. (Bottazzi et al., 2023) In Ghana, adoption and the proportion of land allocated to organic vegetables were influenced by different combinations of demographic, extension, market, land, and association factors. (Boateng et al., 2023) In Nigeria, knowledge of organic farming, marketing organization, and price premiums were associated with adoption and land allocation. (Ume et al., 2023)

The United States evidence from Pennsylvania and the Delmarva Peninsula presents a different institutional setting but reveals comparable challenges. Farmers relied strongly on peer farmers and organic organizations, faced production and weather problems, and demonstrated gaps in knowledge of certified organic practices. (Alotaibi et al., 2021; Marsh et al., 2016) European evidence from Poland emphasizes production risk and regulatory instability, while Turkish research highlights certification costs, credit, and organic input access. (ETİ, 2025; Łuczka & Kalinowski, 2020) Iran's literature similarly identifies certification, marketing, technical information, and credit as central barriers. (Soltani et al., 2013)

The 2024 global review's emphasis on organic market maturity and agricultural productivity helps explain why the same awareness intervention may generate different adoption outcomes across countries. (Möhring et al., 2024) Awareness operates within a system of production capacity, market organization, certification institutions, public support, and social networks. Regional variation is therefore not simply a matter of different farmer attitudes; it also reflects different opportunity structures.

5. Discussion

The literature provides five principal conclusions. First, awareness among primary producers is multidimensional. General recognition of organic farming's environmental and health benefits is more common than detailed knowledge of certification, standards, transition management, market requirements, or technically demanding practices. (Marsh et al., 2016; Singh & George, 2012) Future surveys should therefore avoid treating awareness as a single yes-or-no variable.

Second, positive attitudes are widespread but do not guarantee adoption. Favorable attitudes were reported among farmers in Bangladesh, Uganda, Senegal, and other contexts, yet actual practices or adoption remained limited. (Bottazzi et al., 2023; Islam & Islam, 2020; Nalubwama et al., 2024) The distinction between awareness, attitude, perceived feasibility, intention, initial adoption, and sustained adoption is consequently central to both research and policy.

Third, the evidence supports a combined information-and-systems perspective. Training, extension, information access, and peer learning matter, and experimental evidence from Indonesia indicates that intensive training can improve knowledge, perceptions, and organic input use. (Grimm & Luck, 2020) However, Senegalese evidence shows that additional promotion may have limited effects when farmers already hold positive attitudes but lack inputs, tools, markets, and institutional support. (Bottazzi et al., 2023) Information interventions should therefore be integrated with credit, input supply, certification assistance, market coordination, and conversion support.

Fourth, economic considerations are not opposed to environmental and health motivations. Farmers may value soil, health, and environmental benefits while still requiring price premiums, lower input costs, financial assistance, or compensation for conversion-related losses. (ETİ, 2025; Panneerselvam et al., 2011) Studies from Poland, India, Turkey, Nigeria, and Ghana all demonstrate that market and institutional conditions substantially affect adoption. (Azam & Shaheen, 2019; Boateng et al., 2023; Łuczka & Kalinowski, 2020; Ume et al., 2023)

Fifth, collective organization and social learning deserve greater analytical attention. Farmers frequently obtain information from peers, organizations, and farmer groups, and association membership is associated with adoption or land allocation in several studies. (Alotaibi et al., 2021; Boateng et al., 2023; Sapbamrer & Thammachai, 2021) Extension policy that ignores these networks may fail to reach farmers through trusted channels.

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The strength of the evidence varies. The two systematic reviews provide broad synthesis, but their conclusions depend on the quality and comparability of the underlying studies. (Möhring et al., 2024; Sapbamrer & Thammachai, 2021) Most country-level evidence is cross-sectional and survey-based, which permits the identification of associations but limits causal inference. For example, associations between education, extension, knowledge, or group membership and adoption do not necessarily demonstrate that these factors caused adoption. Farmers who already adopt may be more likely to seek extension, join organizations, or acquire information.

Qualitative studies provide important explanatory depth. The Pennsylvania interviews reveal how farmers use social capital and how they perceive extension, certification, and production risks. (Alotaibi et al., 2021) However, the small and context-specific nature of qualitative samples limits generalization. Training-needs research can guide program design but does not necessarily establish that preferred training formats produce adoption. (Elakkiya & Karthikeyan, 2020) The Indonesian randomized experiment offers stronger causal evidence, although its effects concern a particular intervention and setting and should not automatically be generalized to long-term certified conversion. (Grimm & Luck, 2020)

The corpus also has measurement limitations. Awareness indices, knowledge scores, perception scales, and KAP measures vary considerably between studies. Certification knowledge is often treated as one item or broad category rather than measured through objective questions about standards, conversion, inspections, records, and labeling. Adoption is likewise defined inconsistently, ranging from use of an organic input to full certification or allocation of land to organic production. (Islam & Islam, 2020; Ume et al., 2023) These inconsistencies make comparison difficult.

Geographical coverage is also uneven. The supplied literature includes studies from South and Southeast Asia, parts of Africa, the United States, Europe, Iran, and Turkey, but the number and depth of studies differ substantially by region. The global review explicitly identifies gaps in geographical and methodological coverage. (Möhring et al., 2024) In addition, many

studies focus on farmers' stated perceptions or intentions rather than verified changes in farm practices, certification status, yields, income, or environmental outcomes.

6. Research Gaps and Future Directions

6.1 Longitudinal research on awareness and conversion

The strongest research need is for longitudinal designs that follow farmers from initial awareness through intention, partial adoption, conversion, certification, continuation, or abandonment. Cross-sectional studies cannot adequately distinguish whether awareness precedes adoption or results from it. Longitudinal research should measure changes in knowledge, perceived risk, input use, yields, costs, labor, income, certification status, and land allocation across the conversion period. The Indian evidence showing different outcomes during and after conversion demonstrates why timing is essential. (Panneerselvam et al., 2011)

6.2 Certification-specific knowledge measurement

Future studies should develop validated measures of certification knowledge rather than relying on broad self-reports. Instruments should distinguish awareness of standards, prohibited and permitted inputs, conversion duration, inspection, documentation, traceability, labeling, certification costs, and alternative certification arrangements. This priority follows directly from evidence in India, the United States, Indonesia, Turkey, and Nigeria showing that general organic awareness can coexist with inadequate certification knowledge or access. (ETI, 2025; Marsmetal, 2016) Singh W & George, 2012; Sujianto et al., 2022; Ume et al., 2023)

6.3 Gender-disaggregated and socially differentiated analysis

Although gender appears among the factors associated with adoption, the mechanisms through which it operates remain insufficiently developed in the supplied literature. (Boateng et al., 2023; Sapbamrer & Thammachai, 2021) Future research should examine gender differences in access to land, credit, extension, digital tools, farmer organizations, labor, certification, and markets. Analysis should also consider age, tenancy, wealth, farm size, education, household labor, and off-farm income. Such designs would prevent gender or

demographic variables from being interpreted as simple causal explanations.

6.4 Digital and pluralistic extension channels

The evidence shows that farmers use multiple information sources, including extension, farmer organizations, peers, and organic agriculture networks. (Alotaibi et al., 2021; Nalubwama et al., 2024) Future studies should assess digital extension channels alongside face-to-face approaches. Research should compare mobile advisory services, online farmer groups, videos, digital certification guidance, and local demonstrations with conventional extension. It should also examine whether digital channels improve practical knowledge, not merely awareness, and whether women, older farmers, remote farmers, and low-literacy producers can use them effectively.

6.5 Linking awareness to actual conversion behavior

Many studies measure attitudes, willingness, or perceptions rather than verified conversion. Future research should track whether awareness leads to changes in input use, crop rotation, soil management, pest control, record keeping, certification applications, market participation, and land allocation. The Nigerian and Ghanaian studies demonstrate the value of distinguishing adoption from the proportion of land devoted to organic farming. (Boateng et al., 2023; Ume et al., 2023) Similar distinctions should be incorporated into studies of partial and informal organic production.

6.6 Comparative evaluation of certification and market models

The literature identifies formal certification as a barrier and suggests participatory certification and alternative food networks as possible responses. (Bottazzi et al., 2023) Comparative research should evaluate the costs, credibility, inclusiveness, and market effects of formal certification, group certification, participatory systems, and direct marketing. Such work should investigate whether alternative arrangements improve smallholder access without weakening consumer trust or creating new exclusionary requirements.

6.7 Under-studied regions and policy contexts

The global review identifies gaps in geographical coverage, and the supplied corpus confirms the need for additional research in under-studied regions and production systems. (Möhring et al., 2024) Future work should include more countries in sub-Saharan Africa,

the Middle East, Latin America, Central Asia, and small-island agricultural systems, while also examining crops beyond the better-represented rice, pineapple, vegetables, mango, and horticultural systems. Comparative research should pay attention to market maturity, productivity, public support, climate risks, and the structure of farmer organizations.

6.8 Experimental and implementation research

More randomized and quasi-experimental studies are needed to test which interventions improve awareness and adoption. Possible interventions include hands-on training, certification subsidies, conversion compensation, farmer-field schools, peer mentoring, group marketing, digital advisory services, and bundled packages combining knowledge with input and market support. The Indonesian randomized study provides a model for stronger causal evaluation, but future experiments should measure persistence, cost-effectiveness, and impacts on certified or sustained adoption rather than short-term input use alone. (Grimm & Luck, 2020)

7. Conclusion

The current research indicates that organic farming awareness among primary agricultural producers is substantial in some respects but incomplete in others. Farmers commonly recognize the health, environmental, and economic arguments associated with organic agriculture, yet many remain uncertain about technical practices, certification, standards, input access, market requirements, and conversion risks. Awareness is therefore best understood as a multidimensional resource rather than a single state of knowledge.

The central finding of this review is that awareness is necessary but insufficient for adoption. Positive attitudes may coexist with low practice levels, limited land allocation, abandonment, or reluctance to convert. The gap arises when farmers lack the ability, opportunity, resources, or institutional legitimacy required to act on what they know. Training and extension can improve knowledge and perceptions, and experimental evidence supports the value of intensive practical training. However, information alone is unlikely to overcome weak markets, certification costs, inadequate credit, unstable policies, unavailable organic inputs, low yields, or insufficient transition support.

Future strategies should therefore combine producer-centered learning with system-level interventions. Extension should be practical, locally relevant, and connected to peer networks and farmer organizations. Certification systems should be understandable, affordable, and appropriate for smallholders. Policies should address conversion risk, market access, input supply, credit, and price incentives. Research should move beyond cross-sectional measures of awareness and examine how knowledge develops into actual, sustained, and economically viable organic farming. A more precise understanding of producer awareness can thereby contribute to policies that are not merely promotional, but capable of supporting farmers through the complex process of organic transition.

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