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REVIEW

The impact of agricultural insurance on farmers' mental health: what we can learn from the literature

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Abstract
This systematic review aimed to examine evidence in the extant literature on the nexus between agricultural insurance and the mental health of farmers. The key hypothesis was that increasing access to agricultural insurance will enhance the mental and emotional well-being of farmers globally and will consequently preserve the future of agriculture, particularly as climate change exacerbates weather risk. A systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. We searched several databases, including EBSCOHost Megafile, Scopus, Web of Science, PubMed (Medline) and Google Scholar, based on predetermined criteria in July 2024. We conducted a full-text review of twelve potential articles. None of the articles met the inclusion criteria and reported a clear understanding of the relationship between access to agricultural insurance and the mental health nexus. We concluded that there is no evidence to support the hypothesis that access to agricultural insurance has a positive impact on farmer's mental health. Our hypothesis is premised on the fact that while agricultural insurance smoothens farmers' income, this should lead to some forms of mental health advantage, but we do not have any evidence in extant literature. The lack of literature is perhaps due to the complexity of the agricultural insurance product design. We recommend studies that will provide reliably conclusive evidence on this critical issue because agriculture requires risk management tools to help farmers cope with multidimensional risks, including exacerbated weather events due to climate change.

Keywords Agricultural insurance · Crop insurance · Mental health · Farmer · Systematic review

1 Introduction

Agriculture is a risky endeavor. Attaining mental peace is often challenging when farmers' livelihood depends on circumstances that are beyond their control. Researchers of occupational health have concluded that farming is a demanding occupation (National Crime Records Bureau, 2019; Rao et al., 2017) and might cause poor mental health for several risk factors. Consequently, if farmers' mental health is left unattended, it portends grave

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consequences for the future of human existence. This consequence could best be understood from a Malthusian (Marquette, 1997) perspective, which is that the growth rate in population is faster than that of food production. The impact of the disparity in the growth rates is further exacerbated by climate change, and a poor response to attrition of farmers due to death, particularly suicide, will add to the bleak prospects of agriculture with its attendant consequence for the conservation of human lives. Previous studies on farmer's mental health have classified uncertainty in commodity prices, demanding hours of work, time pressure, isolation, high levels of debt and natural disasters (drought, climate change, flood) as the primary causes of mental stress (Hossain et al., 2008; McInnes et al., 2018; Ramos et al., 2015).

Several researchers (Berry et al., 2011; Carleton, 2017; Kearney et al., 2014) have highlighted that increased climate variability and change are major factors of increased stress levels among rural farmers. For example, Kearney et al. (2014) found that the emergence of climate change has intensified the high level of uncertainty in agricultural production, thus making a farmer's life more stressful. Berry et al. (2011) identified "the need for a systematic epidemiology of the mental health of farmers facing increasing climate change-related weather adversity" and volatility in crop production. Furthermore, Carleton (2017) found that extremely high temperatures during growing seasons (which significantly impacts crop yields) increases the risk of suicide. The temperature increment also affects farm workers through economic shocks that cause both farming and non-farming populations to be at a higher risk of suicide. The aforementioned research also suggested that cushioning the impact of weather risks could reduce suicide rates, but this link between access to insurance and suicide rates has not yet been given sufficient attention in extant research, as evidenced in this review.

Poor mental health (or mental stress) can affect farmers in several ways. It might cause fatigue, lack of sleep, anxiety, and weight change (Simsek et al., 2016; Terrazzas & McCormick, 2018). The situation is so severe that research conducted in India, Sri Lanka, the USA, Canada, England, and Australia have found that people related to the farming sector have a higher suicide rate than the general population (Behere & Bhise, 2009). In 2018, 10,281 farmers committed suicide in India (National Crime Records Bureau, 2019), and undoubtedly, the number will be much higher globally. Farmers in Québecb (Canada) have higher suicide rates (27.4 per 100 000 inhabitants) compared to the mean in the general population of the province (20.2 per 100 000) (Martinez et al., 2004). Others have also found higher suicide rates and poor mental health among farmers compared to the general population in Australia, Japan, and the UK. However, there is a dearth of literature to understand to what extent (or at all) access to agricultural insurance can reduce the risk of poor mental health of farmers globally.

Agricultural insurance could play a vital role in curbing the farmer's mental stress by eliminating farming-related uncertainties. It helps farmers to decrease risk, cope with uncertainty, and attain mental peace. The literature has identified several benefits of crop insurance. For example, Varadan and Kumar (2012) indicated that agricultural insurance reduced production risks, facilitated crop specialization and enhanced farming revenues for farmers in India. The US Federal Crop Insurance Program offers yield and revenue insurance, and the EU has implemented an agricultural risk management system with a special focus on agricultural insurance (Cole & Xiong, 2017). The implication of a poor risk management system in agriculture is that the interest of potential farmers is reduced as they cannot plan their operations and may depend on government payouts for survival and, in some instances, no support in whatsoever form. The attrition of farmers and lack of new entrants into the sector pose a danger as

they increase the risk of high food prices and conflict, and consequently, they are a risk to human existence. Insurance has been considered a tool to stem this development.

According to Diaz-Caneja et al. (2009), Insurance is one of the prime risk management tools for diversifying risks and products. For example, yield insurance covers yield losses for a given crop, whole-farm yield insurance protects from yield losses for all the crops on the farm, revenue insurance takes into account both yield damages and losses due to price change, and income insurance provides compensation for the cost of production Diaz-Caneja et al. (2009). Similarly, Falco et al. (2014) also stated that agricultural insurance can absorb the financial implications of sudden crop failure due to extreme weather events. For instance, climate index insurance has been developed and used in many countries to insure farmers against climate risks (Barnett & Mahul, 2007). The risk of livestock to wild animals could also be managed by using livestock insurance (Loch-Temzelides, 2021), and there are other forms of livestock insurance currently undertaken in other parts of the world, including Kenya (Carter et al., 2014; Logstein, 2016).

In recent days, indexed-based weather insurance has been developed to minimize moral hazards and adverse selection, expedite insurance payouts, and reduce political interference and administrative costs (Jensen & Barrett, 2017). The product works by building weather indices and using the indices as proxies for the events they cause, like floods and droughts. Nevertheless, it is not without its own criticism, such as a basis risk (Adeyinka et al., 2016; Kath et al., 2018, 2019). In Africa, weather index insurance has been used successfully to improve drought response and famine prevention (Chantarat et al., 2007), and in the Southeast Asian region (e.g., Thailand, Indonesia and the Philippines), rainfall index insurance helps sugarcane producers manage yield losses due to excessive rainfalls (Kath et al., 2018). Kousky (2019) also concluded that disaster insurance could facilitate resilience by protecting farmers against financial losses and ensure fast recovery by providing post-disaster liquidity and lowering risks through financial assistance in the event of loss.

Although a number of insurance products are available for farmers to mitigate agricultural-related risk factors, we still do not know much about agricultural insurance and farmer's mental health nexus. The anecdotal evidence suggests that crop insurance helps in improving farmer's health. However, there is a dearth of empirical literature to understand to what extent (or at all) access to agricultural insurance can reduce the risk of poor mental health of farmers globally. Therefore, the aim of this study is to synthesize the contemporary body of knowledge in crop insurance and mental health and robustly document the impact of agriculture insurance on mental health and well-being. The lesson learned from this systematic review will allow us to better appreciate the role of agriculture insurance and contribute to the wider uptake of insurance products.

The basic conceptual framework for the crop insurance and farmer's mental health nexus is as follows:

Various tools of agricultural insurance can be used to reduce uncertainties in agricultural production and income losses. Eliminating uncertainties and risks has the potential to improve mental health and reduce stress, anxiety and suicide among farmers (Fig. 1). Against this backdrop, the current study assumes that agricultural insurance (when implemented successfully) has the potential to impact farmer's mental health. Therefore, this study provides a narrative synthesis of the current evidence in the literature, which examines the impact of agricultural insurance on the mental health and well-being of farmers.

Fig. 1 Conceptual framework of the probable impact of agricultural insurance on farmer's mental health

2 Method

This study conducts a systematic literature review using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. Two authors independently searched several databases (e.g. EBSCO host, Scopus, Web of Science, EMBASE, PsycINFO and PubMed (Medline)) based on predetermined criteria in July 2024. The PICOS (Population, Intervention, Comparison and Outcomes) description and eligibility criteria are reported in Tables 1 and 2, respectively. The PICOS tool is commonly used to identify components of clinical evidence for systematic reviews in evidence-based medicine (endorsed by the Cochrane Collaboration) (Higgins et al., 2019).

We searched both qualitative and quantitative studies written in English and published in peer-reviewed journals. We also searched studies or reports from grey literature. However, grey literature is often presented in diverse formats, and it is a significant challenge to search, read and include them in a systematic review Paez (2017). This study used the three main search terms (agricultural insurance, farmer and mental health) and their alternative word choices in the literature (along with the Boolean operators). However, we did not apply any time limit in our search criteria. Although the

Table 1 PICOS description

PICOS	Description
Population	Farmers (all agricultural producers)
Intervention	Access to agricultural insurance
Comparison	No agricultural insurance facility
Outcome	Mental health (all measures)
Study design	Quantitative and qualitative studies

Table 2 Inclusion and exclusion criteria

Criterion	Eligibility	Exclusion
Literature type	Peer-reviewed published journal articles	Book, book series, chapter in book, conference proceeding, online report, short comments, correspondence, short points, reviews or letters, invited editorials, pre-prints without peer review, letter to the editor or editorials that summarised the results of the included articles
Language	English (no studies were available in the official language of China)	Non-English language literature
Country	Articles from all countries	None
Outcomes	Studies that focused on understanding or reported data on the agricultural insurance and mental health nexus	Studies focused on health insurance or social /welfare insurance and mental health nexus
Study design	Both qualitative and quantitative study design	

search terms remained fixed, the search strategies changed based on the requirements of the specific database. Table 3 provides information regarding database search terms.

The two authors independently searched the titles, abstracts and keywords of the potential research articles generated by the above databases. All the available studies were evaluated based on the predetermined inclusion and exclusion criteria. If any confusion arose regarding the decision of inclusion of any articles, further consultations were made with the remaining co-authors. Another co-author conducted a backward search by scanning the references for the articles included. Through this process, we extracted data related to author, year, study design and setting, participant characteristics, insurance characteristics, the time period of the study, and key findings of the study.

The aim of this study is to provide a narrative synthesis of the current evidence on the impact of access to agricultural insurance on farmer's mental health. We further employed the Strengthening the Reporting of Observational Studies in Epidemiology (Cai et al., 2015) (items 1–8, 10–14, 16, 18–20, 22) statement checklist to assess the quality of the included studies (Rao et al., 2017). EndNote 21 was the reference management software.

3 Results and discussion

The search process generated a total of three hundred and thirty-eight articles, which were identified through the above-set criteria. EBSCOHost Megafile generated 127 articles; we got 69 from Google Scholar, 75 from PubMed, 2 from Scopus and 65 from Web of Science. EBSCOHost Megafile contained several databases, including PsycInfo. However, only two hundred and ninety-four articles remained after duplicates (43) and non-English articles (1) were removed as shown in Fig. 2. After scrutinizing the title and abstract, we considered forty-eight articles as eligible for retrieval. There were eighteen articles that were excluded because they did not feature the mental health of farmers, fifteen were excluded because they did not consider agricultural insurance, and three did

Table 3 Database search

Database	Search terms
EBSCO host Scopus Web of science PsycINFO PubMed (Medline)	Keyword: Agricultural insurance ("Agricultural insurance" OR "Farming insurance" OR "Crop insurance" OR "Livestock insurance" OR "Aqua cultural insurance" OR "Forestry Insurance" OR "Agribusiness Insurance" OR "Crop credit insurance" OR "index insurance") Keyword: Farmers (Farmer* OR Peasant* OR agricultural producer* OR agricultural supplier* OR agricultural grower* OR farm owner* OR cultivator* or planter* OR agriculture* OR copper* OR agronomist* OR rancher* OR agricultural harvester*) Keyword: Mental health ("Mental health" OR "psychological health" OR "mental well*" OR "mental stability*" OR "mental distress" OR "mental balance" OR "mental illness" OR "mental sick*" OR "mental disorder" OR "psychological distress" OR "mental disability*" OR "psychological illness*" OR psychological disability* OR "psychological resilience" OR "psychological stability" OR "psychological disorder" OR "psychological problem" OR "balance of mind" OR "psychological condition" OR "psychological state" OR "psychiatric condition" OR "psychiatric state" OR "emotional well*" OR "emotional disorder" OR "anxiety" OR "stress" OR "distress" OR "depression")

For all the keywords, we have searched for medical terms or word variations

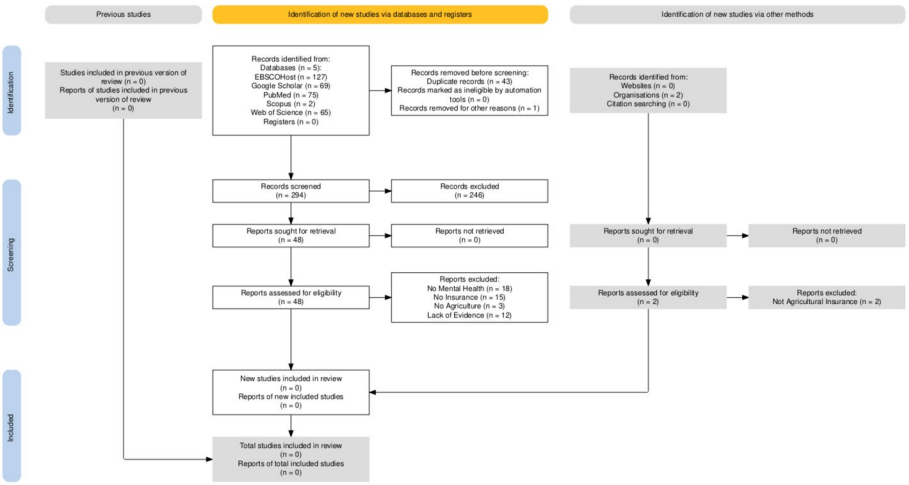

Fig. 2 PRISMA flow diagram for systematic literature review of the impact of agricultural insurance on farmers' health.

not consider farmers. Consequently, twelve articles remained out of the forty-eight that were excluded for lack of evidence of the relationship between farmers' mental health and agricultural insurance. Furthermore, we presented in Fig. 3 a Ven Diagram to represent the lack of evidence to support the nexus. The diagram was constructed using Lucidspark (lucidspark.com).

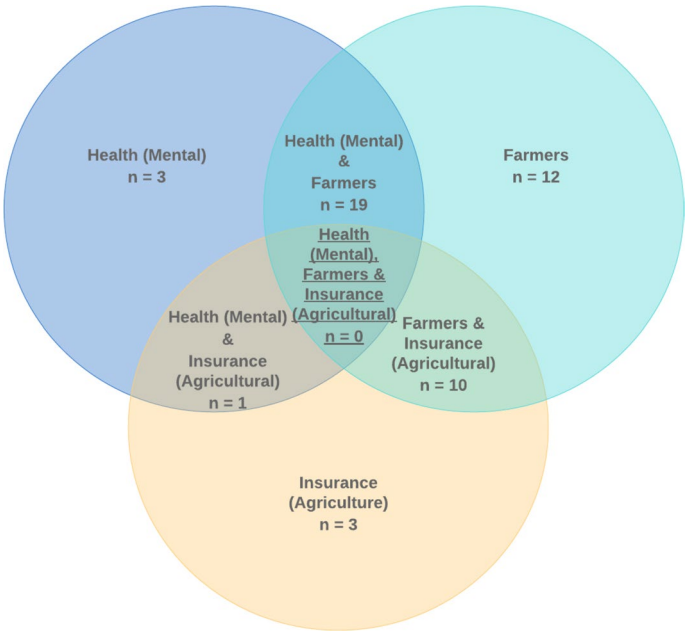

Fig. 3 Venn diagrammatic representation of the forty eight eligible articles

In a previous version of this paper, we considered five articles very critically after an extensive search process (Carleton, 2017; Cole & Xiong, 2017; Hatt et al., 2012; Higgins et al., 2019; Roy et al., 2013). However, after a thorough review of the full text of these five articles, it reveals that none of these articles met the inclusion criteria. We scrutinized these five publications based on our current process and the PRISMA diagram workflow by Haddaway et al. (2022) and none was found to fulfill the inclusion criteria. In addition, we conducted a thorough backward search of all these articles, which did not generate any relevant additional studies. Furthermore, two articles (Agarwal et al., 2022; Hovey & Seligman, 2006) were recommended by an anonymous reviewer of the previous version of this work.

Among the excluded studies in our first version, Rao et al. (2017) suggest that agricultural insurance could be a possible solution to reducing farmers' suicide risk. Similarly, Bhukuth et al. (2019) conclude that an efficient insurance program would reduce the risks of related crop loss and over-indebtedness of farmers, ultimately lowering the suicide rate among farmers. However, these articles did not conduct any qualitative or quantitative research to deduce such conclusions.

The article by Agarwal et al. (2022) recommended by the anonymous reviewer, had four key findings:

(i) Pension and health insurance led to a significant reduction in symptoms of depression and anxiety among workers, particularly among the elderly.
(ii) Workfare participation led to a reduction in depression among women by increasing income security. However, in addition to financial security, non-pecuniary benefits of employment were also observed among the unemployed refugee men.
(iii) CT led to a reduction in suicides among farmers during adverse income shocks and, in general, improved the mental health of recipients. However, when the recipients perceived CT as stigmatizing or perceived the compliance condition (as in CCT) as an additional burden, the effects of CT on mental health were negative.
(iv) Microfinance schemes had mixed effects on the mental health of the participants, primarily women. While it led to a reduction in depression and anxiety, loan repayment was often reported to be stressful.

It is evident in the findings above that the types of insurance considered were health insurance and not agricultural insurance. The second article, recommended by the reviewer, was based on migrant farm workers (Hovey & Seligman, 2006). The article highlights external and internal stressors for farmers and farm workers with their attendant consequences. There was only one reference to lack of insurance as an external stressor—*"Lack of medical care and health insurance (p.286)"*. It was interesting to note that a lack of agricultural insurance was not considered an external stressor for farmers, while a lack of health insurance was considered. Perhaps, this gap was due to the fact that adhoc government support has been taken as a substitute for agricultural insurance. These two articles suggest that the insurance and mental health nexus among farmers is recognized in literature, but the nexus between the mental health of farmers and agricultural insurance, in particular, is yet to be given any form of attention. In essence, evidence is, at best, anecdotal and is based on factoids rather than facts.

In another effort to obtain some evidence of the mental health and agricultural insurance nexus among farmers, we generated the forty-eight articles that were presented in the Venn Diagram (Fig. 3). A thorough analysis of these papers indicated that there is no evidence of the relationship between mental health and agricultural insurance relationship in

extant literature. Although some of the articles made mention of agricultural insurance as a means of alleviating farmers' mental health, they did not provide any scientific evidence of that effect (Oyekale, 2015; Noritomo & Takahashi, 2020; Narain et al., 2015; Villarejo & Baron, 1999; Van de Meerendonk, 2020; Tang et al., 2023; Rosemann, 2005; Rajeev & Nagendran, 2023; Petit et al., 2023; Patnaik & Swain, 2017; Nicholson, 2021; Odabasi & Hartaska, 2021).

More specifically, Oyekale (2015) emphasized the provision of weather forecasts and some form of insurance in the portfolio of efforts to assist cocoa farmers in Nigeria in alleviating their stress. Noritomo and Takahashi (2020) considered the impact of index-based livestock insurance on reducing poverty traps among Kenyan farmers but not their mental health. Narain et al. (2015) concluded that two-thirds of the farming population in Uttar Pradesh, India, were high to moderately susceptible to stress. Although the researchers considered crop insurance to be available as part of the profile of the farmers, they did not model this on their stress, with only 16.86% of the 350 respondents availing themselves of crop insurance. Villarejo and Baron (1999) observed mental health as one of the issues that hired farm workers face in the USA, while Van de Meerendonk (2020) examined the tensions that farmers face in making their insurance claims in Beed District of Central Maharashtra in India. Livelihood resilience among farmers in poverty-stricken areas of China was the focus of Tang et al. (2023), while Rosemann (2005) acknowledged the mental health distresses of some adverse situations on farmers' mental health in a behavioural intervention program (Sowing the seeds of hope). These projects did not provide any evidence required to establish the mental health and agricultural insurance nexus.

Furthermore, Rajeev and Nagendran (2023) established a link between informal interest rates and crop insurance but asked why farmers rely on informal credit as a coping mechanism in contrast to the use of apparently less expensive formal crop insurance but did not establish the nexus between farmers' mental health and agricultural insurance. In the TRACTOR study reported by Petit et al. (2023), it was found that most French farm managers (FMs) (64.6%) had a depression insurance declaration. The authors established that the risk of depression is higher among older FMs. Patnaik and Swain (2017) examined the reason for the poor uptake of crop insurance in the Kalahandi district of Odhisa without much consideration of the agricultural insurance and mental health nexus. Also, the article by Kaur et al. (2016) identified the causes of farmers' suicide and suggested crop insurance as one of the preventative measures without any research to affirm the suggestion. Finally, the results from Odabasi and Hartaska (2021) showed that farmers have an elevated risk of suicide and found "more suicides in counties with more farms and with a higher share of the population without health insurance, lower agricultural wages and, in non-rural counties, higher poverty rate. Surprisingly, we find more suicides in counties with more social associations, while the availability of mental health providers is associated with fewer suicides in non-rural counties and lower suicide rate in southern counties." (p. 61). The emphasis of this result was health insurance, not agricultural insurance.

We noticed that all the papers we considered but rejected for lack of evidence were journal articles although we searched other reports that were not published, but they were all rejected for the earlier three reasons.

Therefore, our study contributes to the literature to identify the gap in knowledge, and future needs to conduct research on whether agricultural insurance improves the mental wellbeing of farmers. According to Schlosser and Sigafoos Schlosser et al. (2009), a systematic review is important even if it generates no published articles as the results clearly articulate to researchers and policymakers the future need for research in this field. However, we should be cautious about drawing any conclusion based on our systematic

literature review that the lack of evidence in the existing literature should not be interpreted as evidence of no effect.

It is not uncommon in the literature review to find no published empirical studies on a novel topic. Previously, a substantial number of empty systematic literature reviews with zero studies were included in the Cochrane Database of Systematic Reviews (Campillo et al., 2017; Leighton et al., 2021; Yaffe et al., 2012). Empty systematic reviews are those that fail to find any suitable article (based on the set inclusion and exclusion criteria) to include in the study. Therefore, the Cochrane Effective Practice and Organization of Care (EPOC) provides specific guidance for the reporting of Cochrane systematic reviews (EPOC, 2017). It contains specific guidance for reporting empty reviews. Based on the EPOC's suggestion, three tables related to the systematic search of the database have been presented. Table 1 shows the population, intervention, comparison, outcome and study design (PICOS) description, Table 2 presents the preset inclusion and exclusion criteria, and Table 3 illustrates the details of the database searched and a broad search strategy. Hence, it is evident that the research question was not narrowly defined. At the beginning of this study, the aim was to find peer-reviewed articles that examined the agricultural and farmer's mental health nexus. After conducting an extensive literature search, it is apparent that there is no empirical evidence.

4 Exploring the causes for lack of empirical evidence

Past studies concluded that empty reviews are the results of a comprehensive search where zero number of studies are located that met all the inclusion and exclusion criteria. A search in the Cochrane Library in 2010 revealed 4320 empty reviews (8.7% of the reviews) (Joseph et al., 2016; Klugarova et al., 2016). There are several general reasons for an empty review. They are: (a) the review question being an area of study with a very limited research base; (b) the review question being highly specific; (c) very limited inclusion criteria; and (d) the area of research is too new to provide adequate evidence. Slyer (2016) demonstrated that empty reviews have important policy implications (representing a key research gap) and Lang et al. (2007) suggested that authors of empty reviews should clearly mention that no clear conclusion could be drawn from the study.

After failing to locate any peer-reviewed published article, we made attempts to identify issues that might have contributed to this lack of evidence. Some key noticeable issues that might have contributed to the lack of evidence for the current systematic literature review include the following:

4.1 Inadequate access to agricultural insurance

Firstly, there is a scarcity of agricultural insurance globally. As indicated by a World Bank report, only one-third of the middle- and low-income countries offer agricultural insurance.[44] According to Iturrioz (2009), Africa, Latin America, and Asia account for just 1%, 2%, and 18% of global agricultural insurance premiums, respectively. A majority of the smallholder farmers in developing countries have minimal experience with crop insurance. Cai et al. (2015) stated that weather insurance for crops was not introduced in China until 2010, piloted under heavy government subsidies. This lack of agricultural insurance in developing countries has made it difficult for researchers to collect pertinent data to link access to crop insurance with farmers' mental health. In places where agricultural

insurance is available, Biswal and Bahinipati (2022) enumerated some behavioral anomalies that have prevented uptake including the framing effect, ambiguity aversion, cognitive biases and lack of trust in crop insurance.

4.2 Lack of research findings, focus and multidisciplinary collaborations

In many developing countries with high farmer suicide rates, many researchers and donor agencies' focus is only on alleviating poverty and increasing agricultural yields. Large-scale funding for research related to understanding health (physical, psychological and psychosocial) is virtually non-existent. This might have contributed to the inadequacy of data in the existing literature. Understanding the nexus between access to crop insurance and farmers' mental health would require strong collaboration from multidisciplinary stakeholders.

Furthermore, there are also possibilities that access to crop insurance has an indirect (rather than direct) relationship with farmer's mental health. For example, it could be an intervening or moderator variable (factor) rather than a direct explanatory variable (factor) that impacts a farmer's mental health outcome. Due to this, previous studies might have overlooked access to crop insurance as a key variable while estimating the factors affecting farmers' mental health (Bossard et al., 2016; Perceval et al., 2019).

4.3 Narrow scope of the study

Lastly, the lack of findings of suitable studies may have also resulted from the narrow scope of this study. Due to the commercial nature of agricultural insurance, there is potential that large crop insurance companies have collected and presented such data (crop insurance and mental health nexus) in their internal reports, which is publicly unavailable. Therefore, meaningful collaborations between academic researchers of various disciplines and insurance companies could be the key to developing a large-scale novel study that will estimate whether there is a significant relationship between access to crop insurance and farmer's mental health.

4.4 Inefficiency of the current agricultural insurance market

It is evident that although the concept and objective of agricultural insurance are to alleviate risks and losses related to farming, it has not been entirely successful in doing so. Many challenges remain.

First, one apparent justification could be the failure of the existing agricultural insurance system to curb agricultural risks and losses significantly and, thereby, the mental well-being of farmers. As portrayed in the conceptual framework (Fig. 1), access to and use of agricultural insurance products indirectly impacts farmers' mental health if it reduces losses and risks related to agricultural production and business.

Second, there is a lot of evidence to indicate that the current agricultural insurance products have failed to make an impact in terms of mitigating farming risks and losses (Ali et al., 2020; Kousky & Cooke, 2012). For example, Hatt et al. (2012) concluded that the traditional agricultural insurance system has failed to mitigate the problem of asymmetric information, moral hazards and other systematic risks. Therefore, the demand for traditional insurance products is very low due to high premium costs. Similarly, Innovation

for Poverty Action (2012), in their report, shows that hidden, unavailability and inequality of agricultural-related information make it difficult for agricultural insurance providers to offer viable and effective insurance products.

Third, another key factor that further adds complexity to designing insurance products is the issue of moral hazards. Having agricultural insurance might alter farmers' incentives to take necessary actions to reduce risk because they expect to receive compensation for production and revenue losses (Annan & Schlenker, 2015; Hughes, 2018). Moreover, a farmer might be more willing to insure only the high-risk crops and cultivated lands. These problems have impeded the development of an economically viable agricultural insurance system, especially in the absence of government subsidies. The adverse selection, moral hazard and increasing risk of crop loss due to erratic weather patterns have kept the agricultural insurance premiums high, resulting in lower uptake. In many cases, insurance companies either refuse to insure certain farm production or ask for extremely high premiums. In this current scenario, it is challenging to draw any conclusion based on real-life instances of whether agricultural insurance has brought peace of mind and thereby reduced farmers' mental distress at a significant level.

Fourth, farmers also do not have confidence in methods of assessment of crop loss, insufficient claim payment, and delay in processing insurance claims. These issues are more familiar with agricultural insurance systems in developing countries (e.g., India) (Bera, 2019). In rural India, there is extensive evidence of poor claim settlement, disputes over the assessment of crop losses, and farmers' lack of understanding of the complex crop insurance system. Therefore, crop insurance has not delivered a safety net for vulnerable farmers (Bera, 2019). Agricultural insurance in developing countries has also failed to protect farmers against price risk (Joshi, 2018). Adverse weather affects agricultural production, but during a normal year, farmers might experience price risk (significant fall in the price of crops), which might severely reduce their income. Finally, agricultural insurance in developing countries often excludes sharecroppers or tenant farmers. Besides, the global equilibrium in agriculture is not in favour of farmers in developing countries because subsidies aimed at supporting farmers in developed countries disadvantage their poorer counterparts in the developing countries (GATT, 1947; Geman, 2014). These are crucial issues that require further attention.

4.5 Paucity of uptake of index-insurance

In developed countries, researchers have found several barriers to the adoption of traditional agricultural insurance, such as a lack of trust in the modelling approach used to estimate production loss and forecast the probability of loss and inefficiency in insurance contract design (Peterson, 2012). In recent days, index insurance has been promoted as a product that solves the asymmetric information problem, hence lowering insurance costs. Despite that, it did not have a significant impact on reducing costs. The uptake of index insurance is still uncommon in developing countries, and it is more complex to understand. Index insurance uses weather station data or model output to determine whether a payout is necessary. Farmers often raised concerns about the average forecast method and inaccuracy of the data due to the lack of nearby weather stations (Hatt et al., 2012). However, satellite data are now being used to deliver better products (Adeyinka et al., 2022).

In light of the above discussion, globally, low uptake of agricultural insurance and lower willingness to pay for higher insurance premiums indicate farmers' perceived benefits of having agricultural insurance. Consequently, very few agricultural insurance schemes in

the world are not highly subsidized (Ghosh et al., 2021). Findings in the literature indicate that agricultural insurance may have been unsuccessful in reducing risks and providing a sound safety net against farming losses. Therefore, the lack of evidence in the existing literature on the nexus between agricultural insurance and farmers' mental health seems justifiable. However, the trends are changing, particularly in the case of weather index insurance, particularly those based on satellite readings, that is gaining ground in helping farmers. The case of Kilimo Salama in Kenya is among the most prominent (Behere, 2009; van Asseldonk, 2013).

5 Conclusion

Farmer's mental health and wellbeing are important issues for society. Various risks related to agriculture (e.g., market, weather and climate variability) are major causes of increasing mental stress for farmers. The COVID-19 pandemic has further aggravated production, labor and price-related problems faced by agricultural farmers (Cortignani et al., 2020). An effective agricultural insurance system should reduce agricultural risks (e.g., speed payout after production or revenue loss) and improve the peace of mind as well as the mental health of farmers. However, after an extensive search, we were unable to identify any peer-reviewed published article that investigated access to agricultural insurance and farmers' mental health nexus. Hence, we conclude that the area of research is yet to be sufficiently explored. According to our expert assessment, inefficiencies of the current agricultural system (e.g., moral hazards, very high-risk premiums and inappropriate methods of assessment of crop loss), inadequate funding and focus in these research areas, lack of uptake of agricultural insurance by farmers globally, and high agricultural risk premiums may have contributed to this lack of empirical research and evidence. We strongly believe that the lack of research in this space is a demonstration of neglect of a critical niche of human endeavour that holds the key to the future of the human race because attrition of farmers through suicide portends the level of risk of farming. The consequence is that owners of productive capacity will shift their assets towards other businesses, thereby increasing food prices. The scramble for scarce food resources could lead to other vices, including war and illegal migration.

Therefore, further studies are required to understand whether access to and utilization of agricultural insurance can reduce mental stress and promote the mental health and well-being of farmers. Further, studies are required to understand which agricultural insurance design or system is more effective (in what setting) in reducing mental stress or illness (if at all). In essence, how could the market best evolve to make farming a more rewarding venture? Understanding the impact of agricultural products would assist the policymakers in constructing informed decisions towards improving agricultural insurance not only for reducing risks but also to improve the mental health well-being of farmers around the world and its accompanying implications for human survival.

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Declarations

Conflict of interest The authors have no conflict of interest.

Data availability The data generated in this review paper was based on the search criteria indicated in Table 3 of the paper. The final output from processing the results generated are cited on line 22 of Page 6 of the manuscript.

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