



# Multidimensional measures of farmer well-being: A scoping review

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Accepted: 4 June 2024 / Published online: 12 July 2024  
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## Abstract

Determinants of farmer well-being can be derived from objective and subjective measures of social components, environmental sustainability indicators, and quality of life indices, as well as the multiple scales that farms and farmers operate. Yet, despite multiple frameworks on farmer well-being, the extent to which farmer-expressed values are used in the development of farmer well-being indicators is unclear. Challenges can arise from extracting indicators that are insufficiently grounded in place, or that inadequately incorporate context and biocultural relations and practices. Here in this scoping review, we synthesize the methodologies in the literature on assessing farmer well-being and identify the extent to which farmer well-being domains are derived from values expressed directly by farmers. We consolidated and coded 92 papers to respond to the following questions: (1) What are the most frequent farmer well-being domains in published studies? (2) What methods are used to elicit multidimensional farmer well-being domains? (3) Do well-being domains used in the literature adequately reflect a biocultural context, including place-based influences on well-being? Our results show that economics and social relationships are frequent domains of how farmer well-being is identified and assessed. These domains tend to be measured simultaneously, while less common domains, such as governance and place, are rather isolated. A suite of methods was used to assess well-being domains, ranging from basic surveys to in-depth participant observation. Yet, we identify gaps in the methods for deriving farmer well-being indicators. Specifically, methods that refer to farmer-expressed values were rare and domains identified through a place-based approach were often not recorded, but, arguably, critical in developing multidimensionality of farmer well-being. We show that while the translocal approach is well represented in established well-being frameworks, farmer expression is not foundational in well-being assessments but is needed in order to center farmer values when generating indicators of well-being.

**Keywords** Biocultural approach · Farmer values · Place-based · Sustainable agriculture · Well-being dimensions · Well-being indicators

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## 1 Introduction

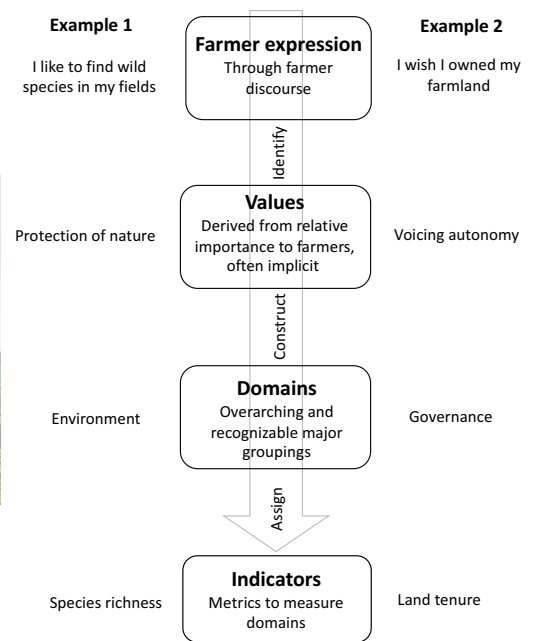
Farmer well-being is influenced by a multitude of factors. These include environmental, social, political, and economic factors, such as soil health, social capital, and material living conditions (Schirmer et al. 2013; Brigance et al. 2018; Sabillon et al. 2021), which can be either objective (e.g., physical health and economical welfare) or subjective (e.g., satisfaction of one's own existence) (Dasgupta 2001). Farmers can derive well-being from processes that operate at and across multiple spatial scales including farm, landscape, community, national and international (Latruffe et al. 2016; Hammersley et al. 2022). Yet, many factors also have a negative impact on the well-being of farmers, i.e., ill-being, including climatic hazards (e.g., floods and droughts) and change, economic pressure (e.g., increase in the cost of inputs and price volatility), public policies and regulations (administrative work), and social isolation (Isakson 2015; Mills et al. 2021; Talukder et al. 2021). The definition of well-being spans mental and physical health, social, cultural, spiritual, economic, and political elements (see King et al. 2014; Barrington-Leigh and Escande 2018), all of which are strongly multidimensional and context-dependent. The appropriate assessment of farmer well-being underpins the accurate development of sustainability indicators in agriculture (Brown et al. 2021) and is the basis of well-being frameworks that inform policy (Betley et al. 2021). Including elements of farmer well-being has become a priority for many emerging agriculture programs, such as crop credit and insurance programs (DeLay et al. 2020), or pesticide-free agriculture (Jacquet et al. 2022). Notably, assessments of well-being are critical as farmers are increasingly suffering from depression and burnout (see Brew et al. 2016; Jones-Bitton et al. 2020).

While there is much scholarship on the development of sustainability indicators in agriculture (Latruffe et al. 2016) and on well-being indicators for farmers (Brown et al. 2021; Mills et al. 2021; Sabillon et al. 2021), there remains many and sometimes opposing ways in which farmer well-being is assessed (for instance, including explicit consideration of ill-being). King et al. (2014) describe the assessment of well-being in a social-ecological context, and highlight the evolution of ways to assess well-being, from a narrow focus on objective measures of economic conditions to a more complex and holistic concept through including subjective and objective measures of social components, environmental sustainability indicators, quality of life indices, and theories of multidimensional well-being. Breslow et al. (2017) present a framework for determining indicators of well-being specifically for ecosystem-based management, and advance previous frameworks by including multi-directional relationships among well-being indicators, and identify comparable

categories based on context specific factors. Specific to agriculture, Brown et al. (2021) argue that most agricultural sustainability indicator frameworks do not include farmer well-being, but provide evidence that the inclusion of subjective well-being measures contribute more fully to what constitutes farmer well-being. In fact, Sabillon et al. (2021) conclude from their large-scale assessment of farm level factors on farmer well-being that it is essential to integrate measures of farmers' point of view of social issues to achieve true multi-dimensional indicators. Yet, despite multiple frameworks on well-being, the extent to which farmer-expressed values are used in the development of farmer well-being indicators remains unclear.

The values that underpin these frameworks are not always explicitly formulated but rather implicit in the methods used to measure well-being (Brown et al. 2021). Processes to filter a large array of *values* into *domains* of well-being are common (Breslow et al. 2017), leading to diverse steps of aggregation or decomposition to determine well-being indicators. In Fig. 1, we conceptualize this process moving from farmer values to well-being indicators through various domains. Values, or expressed individual motivations, are aggregated to generate significant domains of what constitutes well-being. These well-being domains are constructed as overarching and recognizable major groupings, similar to the Sustainable Development Goal (SDG) biosphere, economics, and social domains. Domains of well-being can be assessed by the assignment of indicators that are measured in order to compare well-being among farmers and across locations and time (albeit not without limitations). For instance, *protection of nature* may be a farmer value, which, among other related values such as *landscape beauty*, are aggregated into a domain "environment" and can be measured by indicators such as "species richness." Or *voicing autonomy* may be a farmer value, which among other related values such as *freedom* is aggregated into a domain "governance" and can be measured by the indicator "land tenure." However, in addition to these values, we add farmers' expression of their well-being or ill-being in terms of specific forms of attachment and practices, and specifically as articulated by the respondent in the process of indicator identification. For instance, farmers may express "*I like to find wild species in my fields*" or "*I wish I owned my farmland.*" While capturing farmer expression occurs as part of a discourse during interview processes, this inclusion of farmer narratives responds to the long-standing call for place-based and biocultural approaches in sustainability assessments (Merçon et al. 2019; Hanspach et al. 2020). This pathway to the identification and development of well-being values, domains and indicators includes what constitutes well-being for the farmer through self-expressed, locally

**Fig. 1** Pathway to determine and assess farmer well-being. Farmers express narratives about their lives from which values are identified. These values are then constructed into well-being domains, from which indicators to measure are assigned. Two examples of each step are provided. Photo of a diversified agricultural system (photo credit: M. Isaac).



informed descriptions, which are in turn key to embracing equity and representation in well-being assessments (Betley et al. 2021).

Challenges can arise from extracting indicators that are insufficiently grounded in place, or that inadequately incorporate context and biocultural relations and practices (Sterling et al. 2017; McCarter et al. 2018; Sébastien 2020). Determinants of well-being are not only dependent on the intrinsic characteristics of individuals but also on context, including that which is constituted by the relations and practices that link individuals to other people and elements of the non-human world within a local, holistic, social-ecological landscape. For instance, environment can be considered as a “constituent” (internal) element of well-being, rather than a “determinant” (external) one (Dasgupta 2001). To address these overlooked aspects of indicator development, biocultural approaches embed the shared experiences, behaviors, and beliefs of local communities through a place-based approach that informs our understanding of the relationships between farmers and their environment (Gavin et al. 2015; Caillon et al. 2017; McCarter et al. 2018). Such approaches offer the promise of embracing both biological and social-cultural aspects of well-being, and of addressing the complex relationships and feedbacks between human and non-human entities *in situ* (Rose et al. 2017; Hanspach et al. 2020; Betley et al. 2021). A biocultural framing of well-being also allows for embracing multiple forms of knowledge (Raymond et al. 2019) and has been recently highlighted as critical to effective environmental policy-making (Merçon et al. 2019). The development of farmer well-being indicators often overlooks such social-cultural dimensions, even though

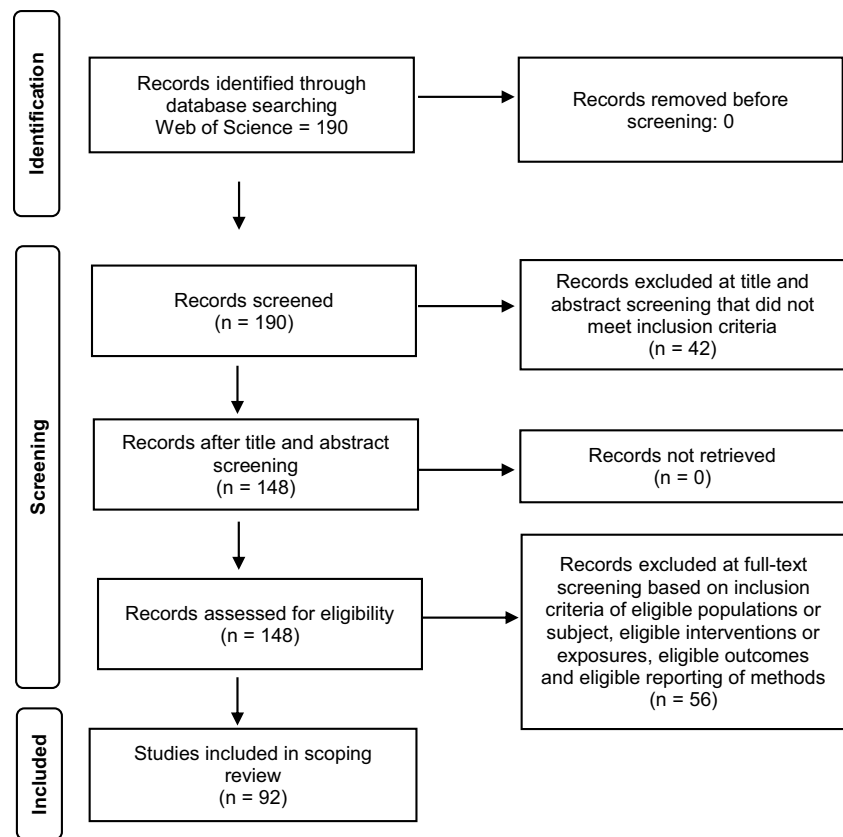
these factors of well-being are recognized as critical to achieve sustainability in agriculture (Brennan et al. 2020).

In order to better understand how the dimensionality of farmer well-being is being assessed, particularly what and how well-being is being measured, we conducted a scoping review of the peer-reviewed literature. The objective of this paper is to identify farmer well-being domains and the extent to which well-being domains are derived from subjective values expressed directly by farmers within published studies. We ask the following research questions: (1) What are the most frequent farmer well-being domains in published studies? (2) What methods are used to elicit multidimensional farmer well-being domains? (3) Do well-being domains used in the literature adequately reflect a biocultural context, including place-based influences on well-being? (4) Are recommendations derived from well-being indicators reported as implemented in the published literature?

## 2 Search strategy, screening protocol, and analysis

To gather studies related to farmer well-being, we conducted a scoping review of peer-reviewed literature. Similar to reviews conducted on well-being and equity (Betley et al. 2021), we followed the “Guidelines and Standards for Evidence Synthesis in Environmental Management” (Bangor University, Collaboration for Environmental Evidence, 2018). Our scoping review had five steps: (1) querying academic literature databases for relevant studies; (2) screening titles and abstracts to determine if a study meets our inclusion criteria; (3) screening the full text of studies that passed

**Fig. 2** Scoping review search method including identification of articles, screening with inclusion criteria and the number of included studies.



our screening; (4) extracting relevant data outlined in our code book; and (5) summarizing results.

We used Web of Science 12.1.20, all databases, all languages, January 2000 to November 2021, run with Columbia University Scholar access. Our research query was:

indicator OR metric OR index OR indices AND evaluat\* OR assess\* OR monitor\* OR measur\* OR impact OR framework OR outcome AND wellbeing OR well-being OR "farmer well-being" OR "farmer wellbeing" OR "farmer well being" OR dissatisfaction OR unhapp\* AND agriculture OR agroeco\* OR agronom\* OR agrofor\* OR biodynamic OR "organic agriculture.

These search terms were used to gather all studies related to farmer well-being. A flow diagram (Page et al. 2021) illustrating our study screening for our scoping review is shown in Fig. 2.

Our search resulted in 190 articles. We screened the abstract and titles of all citations from our search with Colandr (Cheng et al. 2018). Our inclusion criteria were based on eligible populations or subjects—farmers/ farm employees producing food or drink, include links to health, but has to have one or more elements of well-being, include labor if there is a direct link to farm activity/ practice; eligible intervention(s) or exposure(s)—types of farming, including

organic, regenerative, conventional, subsistence and commercial including industrial, needs to be about food/drink, single family or collectives/ cooperatives; eligible outcomes—must include measures of well-being for farmers; eligible types of study design—must include methods, ideal if includes well-being indicators. Using our criteria, we excluded 42 articles that were not relevant to our criteria during screening. Therefore, 148 articles passed initial screening. After a full assessment for eligibility, 56 articles did not meet our inclusion criteria after a full text review. In the end, our review included 92 papers (Supplementary File 1).

A codebook was developed to extract information from each study. Our multidisciplinary coding team created the codebook through an iterative process including blind test coding rounds, involving assigning a pair of coders to code the same paper and thus enable comparison of results. Improvements were made through discussion of discrepancies in coder agreement between coders. We coded for five aspects: (i) descriptive, including geographic location, type of agriculture and well-being definitions, (ii) well-being domains, described below, (iii) method of data collection, such as interviews, focus groups, surveys, landscape/transect walks, (iv) presence of biocultural context, including a discussion of place and place-attachment beyond the location of data collection, and (v) implementation of recommendations, either clearly stated or inferred. We surveyed articles

for 14 domains. Domains included economic, social, environment, agricultural management, general health, physical health, mental health, governance, education, human-nature relationships, affect, culture, place, and ill-being. This list of domains was compiled through an interactive discussion among the research team, based on field work, and existing knowledge of the indicators literature and preconceived categories (Sterling et al. 2017; Breslow et al. 2017; Betley et al. 2021), noting that affect, culture, and place domains were specifically added to respond to our objective of assessing studies for methods that capture place-based and bio-cultural context of well-being measures. In Table 1, we define each domain and provide indicator examples for each from the literature. The co-occurrence network of well-being domain relationships measured within studies was made with an adjacency matrix to generate a network of nodes (domain) and ties (in the same study).

Of the 92 studies included in our review, the largest portion focused on Western Europe with Oceania and South Asia also highly represented (Supplementary File 2). African sub-regions (North, East, West, and South) make up the next largest proportion of the studies' geographies. By country, studies were concentrated in Australia ( $n = 9$ ), France ( $n = 9$ ), and India ( $n = 7$ ). Across all geographic regions, the types of agricultural systems included annual (13%), perennial (6%), or both (33%) production systems. Other agricultural systems represented in the studies were dairy farming, crop-livestock integration, urban gardening, and vineyards. Both conventional and organic/ecological agriculture were represented within these studies.

### 3 Farmer well-being definitions and frameworks

Among the 92 studies, 25 provided an explicit definition of well-being, seven did not state a definition, and a definition can be inferred from 60 studies. Studies with explicit definitions ranged from the “care theory” to elicit grower’s well-being (Alarcon et al. 2020), to composite indicators of well-being based on a suite of components including material wealth, fulfillment of social needs and basic psychological needs (Bartl 2019). Perrin et al. (2020) considered farmer well-being as the evolution over time of farmers’ perception of their satisfaction, while Mourão et al. (2019) were more comprehensive in their definition, which included a person’s physical health, psychological state, level of independence, social relationships, personal beliefs, and relationships to features of their environment. TerAvest et al. (2019) were categorical in their definition, proposing subjective (well-being as life satisfaction and happiness) and material (quantity and quality of physical goods) as separate but interrelated groupings.

Inferred well-being definitions were typically based on aspects of sustainable agriculture. For instance, many of the studies that did not clearly provide a definition used the three pillars of sustainable agriculture (environment, economic, and social) or the four-pillars framework of sustainability indicators (environment, social, economic, and governance). The majority of studies relied on established frameworks (88 out of 92), drawing on concepts such as Nature’s Contributions to People; the sustainable livelihoods approach; life satisfaction domains; or achievement of the SDGs. Yet, while some studies did not directly categorize farmer well-being, they drew upon well-established framings such as the functioning framework by Sen (1985) or capabilities framework by Nussbaum (2000).

## 4 Farmer well-being domains

### 4.1 Domain frequency

Many studies focused on well-established domains such as economics (57%), social relationships (53%), environment (40%), and health—including specifically, physical (40%) and mental (22%) health (see Fig. 3)—with domains such as education also relatively well-represented (32%). Domains, such as place, culture, or affect, were much less common in the surveyed studies on farmer well-being. Among all studies, 89% of studies did not focus on place as a domain, with only 11% of studies mentioning place other than naming the case location as a passive backdrop. Attention to concepts such as place attachment, place meaning, or sense of place was not broadly apparent in the reviewed studies.

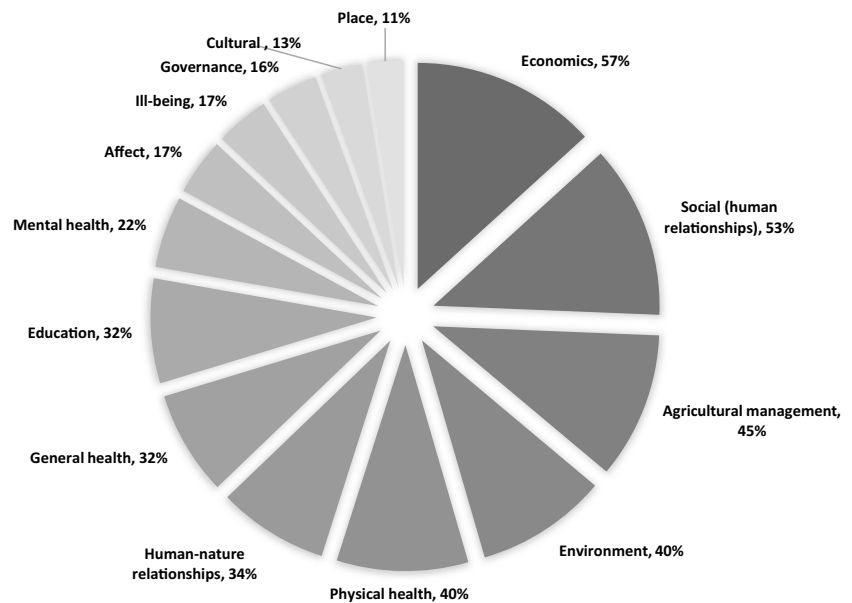
### 4.2 Domain interrelationships

Of the 14 domains in our coding framework, studies on average measured five domains; two studies measured none, rather covering general well-being, attitudes, and perceptions about quality of life (Farnworth 2009; Markussen et al. 2018). Among the suite of domains, studies most often measured economic, social or environmental domains and management practices and their interrelations (Fig. 4). It is common to see studies operationalizing farm income with an aspect of environmental protection and a specific new practice. For instance, TerAvest et al. (2019) used family farm income to assess and compare the well-being of farmers in Malawi across three cropping systems - continuous no-till maize, conservation agriculture rotation, and conventional tillage rotation. Similarly, economic domains were often measured with health domains within a study. Governance was most often measured with culture and education domains. For instance, Ma et al. (2021) show that social relations between farmers in China

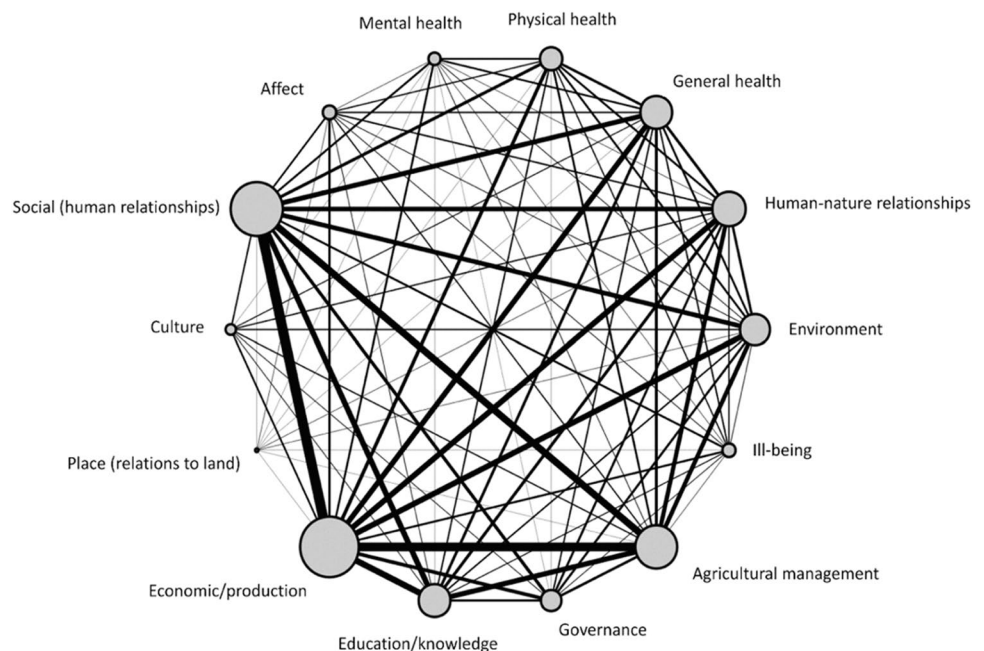
**Table 1** The 14 domain categories coded in the 92 studies included in our analysis. Domains represent the grouping of values, leading to the aggregation or decomposition of well-being indicators. General definitions and indicator examples with citations (Supplementary File 1) of each domain are provided.

Domain	Definition	Indicator examples (source)
Economics	Studies that measure farm yield, profit or reduced costs	<ul style="list-style-type: none"> <li>- Household farm income (Paracchini et al. 2015; Perrin et al. 2020)</li> <li>- Crop yield (Antunes et al. 2017)</li> <li>- Off farm activities (Kallas et al. 2010)</li> <li>- Working hours (Witt et al. 2020)</li> </ul>
Social (human relationships)	Studies that measure aspects related to social activities or social networks	<ul style="list-style-type: none"> <li>- Community connectedness (Peel et al. 2015; Brown et al. 2021; Boncinelli and Casini 2014)</li> <li>- Time for family (Koesling et al. 2008)</li> <li>- Irrigated farmland (Lauer and Sanderson 2020)</li> <li>- Weed control (Rigby et al. 2001)</li> <li>- Intercropping (Templer et al. 2018)</li> </ul>
Agricultural management	Studies that include elements of farm management, specifically practices that affect agricultural landscapes by transforming soil functions and water management	<ul style="list-style-type: none"> <li>- Natural capital /Natural resource stocks (Stiepmann and Nicholas 2018)</li> <li>- Crop diversity (Zahm 2008)</li> </ul>
Environment	Studies that measure the state (ecology) or conservation of natural resources associated with agriculture	<ul style="list-style-type: none"> <li>- Food security (Vilei 2011; Whitehead 2017)</li> <li>- Water quality for household (Vilei 2011)</li> </ul>
Physical health	Studies that include a measure of health of the individual	<ul style="list-style-type: none"> <li>- Value of traditional farming practices (Brennan et al. 2020)</li> <li>- Esthetic enjoyment (Bruley et al. 2021)</li> </ul>
Human-nature relationships	Studies that include a measure of material and immaterial (spiritual, cultural) links between humans and biotic and abiotic elements of the agricultural system	<ul style="list-style-type: none"> <li>- Physical well-being of the farming community (Van Cauwenbergh et al. 2007)</li> <li>- Access to healthcare (Whitehead 2017)</li> </ul>
General health	Studies that include a comprehensive measure of the state of complete emotional, mental, and physical health	<ul style="list-style-type: none"> <li>- Level of education (Vilei 2011)</li> <li>- Access to market information (Martey et al. 2020)</li> </ul>
Education and knowledge	Studies that include a measure of education level or knowledge (awareness, understanding, or information obtained by experience or study and transmitted formally or informally)	<ul style="list-style-type: none"> <li>- Substance abuse; deliberate self-harm and suicide (Kishore and Jadhav 2018)</li> </ul>
Mental health	Studies that include an aspect of mental health that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community.	
Affect	Studies that include concepts of underlying experience of feeling, emotion, attachment, or mood when describing well-being	<ul style="list-style-type: none"> <li>- Optimism about the future (Hansen et al. 2020)</li> <li>- Level of happiness (Bartl 2019)</li> </ul>
Ill-being	Studies that deliberately measure ill-being (condition of being deficient in health, happiness, or prosperity) and not just the lack of well-being	<ul style="list-style-type: none"> <li>- Farmer stress/feeling of loneliness (Hansen et al. 2020)</li> </ul>
Governance	Studies that include aspects related to the process of making and enforcing decisions within an organization or society	<ul style="list-style-type: none"> <li>- Land tenure (Torralba et al. 2018)</li> <li>- Production control quota (Meuwissen et al. 2019)</li> <li>- Policy support from government (Shakya et al. 2019)</li> </ul>
Culture	Studies that measure arts, belief, customs, and other products of human work and thought	<ul style="list-style-type: none"> <li>- Member of a religion and adherence to religious principles (O'Brien et al. 2012; Kaufman et al. 2014)</li> </ul>
Place	Studies that examine relations to land using concepts such as: place attachment, sense of place, place meaning, place identity	<ul style="list-style-type: none"> <li>- Sense of place (Bruley et al. 2021)</li> <li>- Pleasurable working environment (Crimes and Enticott 2019)</li> </ul>

**Fig. 3** Distribution of frequency of the 14 domains measured within the 92 studies. The percentage of studies measuring a particular domain is shown.



**Fig. 4** Relationships between the 14 domains of farmer well-being and ill-being. Nodes represent domains and ties represent co-occurrence of domains in the same study. The frequency of occurring in the same study is indicated by tie thickness. The size of the node indicates the overall rank of mentions among all studies.



were more harmonious under a system of self-governance, leading to higher well-being. Multiple domains were also often measured in relation to working conditions, for instance, Witt et al. (2020) examined occupational factors and health indicators with farm work satisfaction. The few studies that identified place as an aspect of farmer well-being tended to also measure the environment domain and affect domain. For instance, Bruley et al. (2021) capture quality of life as “rural-ity” or links to the region and an affect-oriented “attractiveness” measure, related to tourism.

Ill-being domains were most often measured in studies that also measured social and economic domains but no

studies measured ill-being and culture or infrequently with a place-oriented domain. While ill-being can certainly be measured in association with values of place and culture, these were very uncommon. For example, while a farmer may engage in agricultural practices that are viewed by neighbors as culturally inappropriate “in place” even if these same practices enjoy wider social sanction (e.g., if a farmer is the first in a localized context to adopt an agronomic technique or crop variety), and experiences social isolation as a result, this is rarely measured or captured in studies focused on farmer well-being indicators.

## 5 Assessment of farmer well-being domains

### 5.1 Methods to collect domains

Methods used to identify and measure well-being domains, whether using one or multiple methods in a study, were heavily skewed toward surveys (59 studies) and interviews (45 studies) as the most common approaches to collecting data from farmers on well-being. However, studies also employed more intensive ethnographic methods such as landscape walks (5 studies), focus groups (18 studies), and indicator ranking with groups (10 studies). Other less frequent methods used included physical health assessment tests, participant mapping and satellite observations, soil sampling, and analysis of policy documents. Many studies used well-being frameworks that relied substantially on mixed methods for data collection (51%), with a smaller share focused solely on qualitative (27%) or quantitative (22%) methods. Multiple approaches to standardize rankings of domains were used, including Likert scales, percentiles, and categorization, yet comparability between studies, times, and locations was difficult as the bounds of these rankings were often not described.

Use of predetermined lists of domains to elicit farmers' well-being was common among the 92 studies, through indicator rankings or surveys. For instance, using a scale of 0 to 10, Brown et al. (2021) measured farmer well-being among regenerative agriculture farm managers with an established survey using worthwhileness, life satisfaction, and multi-dimensional domain items (standard of living, personal health, achieving in life, personal relationship, personal safety, community connectedness, and future security). Similarly, using a scoring approach, Kaufman (2015) classified the ability to achieve "good" health and dietary requirements, material needs, and social and family aspirations as environmental, health, financial, social, production, and food security variables. The ubiquity of using a data collection framework with pre-determined domain lists could be partly driven by the need to evaluate domains, which requires a quantitative and comparable component. Ahmed et al. (2019) used a total of 10 indicators across three domains—education, health, and living standards—to compare smallholders' well-being in Ghana against self-reported subjective well-being measures. The subjective well-being domains were also selected ahead of time, with smallholders providing their responses to four questions on a 4-level Likert scale. Establishing subjective well-being domains prior to data collection was also used by others (Garrett et al. 2017; Ma et al. 2021; Perrin et al. 2020), with some revision of domain lists occurring during the interview process.

In contrast, Alarcon et al. (2020) explore how French winegrowers relate to and care for non-humans and the environment

without a predetermined list of domains. Rather, the authors conducted training with winegrowers and discussed their relationships with nature to identify domains through a more grounded approach. Likewise, Bailey and Kingsley (2020) posed open-ended questions to understand the relationship between individual well-being and community gardens in Australia. Through these discussions, the authors found salient domains: personal well-being benefits, community connections and well-being, and environment connections and well-being.

### 5.2 Scale and implementation of domain assessment

Studies most frequently collected data at the local and municipal scale (65%), followed by subnational (13%) and national (11%). Fewer studies captured data at multiple scales (9%). Notably, however, Rivera et al. (2018) conducted interviews and workshops with farmers, research and development experts and advisors, agricultural companies, and representatives of farmers' associations across seven countries to investigate rural prosperity and well-being. Likewise, Antunes et al. (2017) integrated national measures such as domestic water supply and tariff structure, regional measures such as average salary, and local measures such as technical and financial capacity of farmers for their sustainability assessment of irrigated areas.

Among the studies, 67% clearly stated their recommendations for planning and decision making, while 12% of studies did not mention any recommendations. When recommendations were provided, the scale of implementation discussed in the paper was predominately at the local/municipal scale. For their recommendations, several studies discussed the need for validation of data and expansion of frameworks using an iterative process, especially as demand for well-being assessments increases (Häni et al. 2003; Brennan et al. 2020; Poudel et al. 2020). With most studies being cross-sectional, authors also recommended longitudinal studies and long-term monitoring of indicators across multiple scales to better assess farmer well-being (Blackburn et al. 2009; Castonguay et al. 2016).

Despite most studies having explicit recommendations, very few studies describe how recommendations will be integrated into decision-making (10%) nor have an assessment of the implementation (13%). An exception is provided by Mello et al. (2020) who propose solutions to address issues of water and land access among farmers in Wai'anae, Hawai'i, through applying data from research outputs, including maps, to support policy briefs and decision-making. Kaufman (2015) also outline financial support mechanisms that civil society organizations and governmental agencies may target to improve the resilience of organic and non-organic rice farmers in northeast Thailand.



## 6 Discussion: biocultural approaches to farmer well-being multidimensionality

The objective of this paper was to identify the breadth and frequency of farmer well-being domains and the extent to which these domains are derived from values expressed directly by farmers. Among the 92 studies, farmer well-being tended to be defined by generic environmental or economic frameworks. Importantly, we show that the current approach to determining farmer well-being typically relies on pre-established domains rather than those expressed by farmers. While this may lead to the selection of appropriate well-being indicators (Breslow et al. 2017) and the evaluation of well-being indicators at multiple scales (Smith et al. 2018), this current approach may also limit options for farmers to describe what constitutes well-being for them. We found little evidence of the use of farmer expressed values in the sequence of well-being indicator development (Fig. 1). Among studies that utilized emergent well-being values from farmer discussions to define domains, these domains differed substantially from those used in studies that relied on predetermined lists. For instance, Bruley et al. (2021) allowed for emergent quality of life dimensions during participant workshops, which the authors describe as different than specific indicators of well-being. In this study, the concept of “rurality,” or the maintenance of traditional agriculture practices and rural life, was proposed by workshop participants as a key dimension during the process of well-being indicator development (Bruley et al. 2021). Arguably, pre-determining domains in well-being indicator development can result in poor implementation of policies derived from well-being assessments as the scope does not capture the multidimensionality that may be exposed when identified by farmers themselves.

Frequently, more than one domain was measured within the same study. Studies draw heavily on simultaneous indicators of economic and environmental well-being, for instance income, profit, environmental impacts, and/or biodiversity. This is in line with the predominant discourse that connects economics and environment to well-being (Michalos 1997; Smith et al. 2014). What is less established is the connections between place, affect, culture, and other domains of well-being, including mental and physical health, as well as situated social relationships and practices that can influence the subjective understanding and experience of well-being. We found scarce mention of values related to place, which were often not recorded. The lack of place as a domain in these farmer well-being studies is presumably a result of the scope of research methods in the literature, with most studies not deriving self-expressed, locally informed values from a grounded approach. Yet place-based values are critical to achieve multidimensionality when describing well-being (Cuerrier et al. 2015; McCarter et al. 2018). While quantitative well-being indicators may be common for policy and

practical outcomes (Sebastien and Bauler 2013), this is not solely sufficient. The wide range of frameworks (sustainability indicators, sustainable livelihoods approach, life satisfaction domains, achievement of the SDGs, or measuring provisioning, regulating, and cultural ecosystem services) encourages flexibility in methodology but rely on quantitative metrics to achieve comparability. Yet, bioculturally informed well-being indicators have a strong potential to enhance the equity of development strategies and policies (Bunce et al. 2010).

An ethnographic biocultural approach addresses this problem by encouraging the identification of farmer-based subjective values as they are expressed in place (Sébastien 2020). Ethnographic methods create space for the emergence of farmer-derived values, such as participant observation, or actively working with farmers, substantially contributing to a holistic and more representative suite of farmer well-being domains and indicators. While many studies use multiple methods, these methods were in fact closely related, such as surveys and formal questionnaires. For instance, Castoldi and Bechini (2010) used surveys and interviews specifically for economic and environmental indicator values for a global sustainability index and Castonguay et al. (2016) expanded further by using questionnaires, surveys, and interviews to assess rice terrace social-ecological system with a focus on local community perceptions. Mixed method approaches that draw on creative and collaborative ethnographic and grounded research techniques could elicit more situational or context-contingent information, for instance, by incorporating narratives and visualization with interviews, or through the use of focus groups.

A biocultural approach could go a long way to incorporating farmer expression as described in Fig. 1, thus increasing accuracy of well-being priorities and enhancing the meaningful use for policy. Elements of place and locality can play a translatable role in connecting more siloed measures of well-being (Caillon et al. 2017). In particular, subjective attachment to place (or its absence) is an important influence on the subjective experience of well-being; capturing place specific notions and experiences of well-being can help to translate and compare results from different locales. Prioritizing farmer expression as a critical first step may also facilitate the implementation of agricultural policy because these are often bound to evaluations and lack consideration of farmer values (Helne and Hirvilammi 2015). This approach incorporates human-nature interactions and relational values that are central to farmers adopting sustainable agricultural systems (Duru et al. 2015; Isaac et al. 2021; Archibald et al. 2022; Rasmussen et al. 2024) but is overlooked by top-down or a priori approaches to indicator development.

The explicit scale at which domains are developed and operate is critical to well-being, as the local is recognized as a definitive scale for evaluating well-being, even as translocal processes and relationships shape everyday lives. A greater

focus on the “local” experience to understand well-being will capture the multidimensional qualities of farmers’ lives within which relationship and attachment to place is an important mediating influence (Cuerrier et al. 2015; Sébastien 2020). Interestingly though, the scale of data aggregation was often not accounted for in the studies, for example, studies may have combined household data and subnational data to derive a single value for a domain, but adequate consideration of the discrepancy in data resolution across scales was not always evident. Moreover, while many indicators of well-being are identified at the individual or household scale, well-being may be shaped by influences that manifest across multiple scales. For example, in the wine sector, community (e.g., vinicultural cooperatives), regional (e.g., specific wine appellations), or national (e.g., wine sector policies and regulations, including in France under the auspices of the Institut national de l’origine et de la qualité) scale all play a role in influencing farmers’ daily lives. It is also true that international processes and institutions can shape well-being, for example the EU common market in wine and its associated policies, but also international norms in wine-making and in the marketing of wine (using appellations or grape varieties as descriptors for instance). These scalar interactions are important as many farmers may see their well-being consequentially and inextricably tied to relations and processes operating at the local scale and beyond. Also, it is important to avoid methodological individualism and to see the well-being of farmers as it is shaped socially and culturally. The importance of the collective has been thoroughly explored (Aumeeruddy-Thomas and Hmimsa 2019; Betley et al. 2021) but is rarely applied in studies that aim to determine farmer well-being, given methodological issues with linking individual to community outcomes.

## 7 Conclusions

Our review highlights the lack of farmer-expressed values when determining the full scope of what constitutes farmer well-being. While there is some emphasis on translocal dimensions in established well-being indicators, subjective farmer expressions of well-being are not common in the literature and are needed in order to better center farmers in the assessment of their own well-being. Centering local, place-based indicators can enhance the accuracy of sustainability indicators. A biocultural approach can help define sustainability indicators while making room for unidentified or overlooked values. More efforts on integrating farmer-identified and expressed values directly into the assessment of farmer well-being will undoubtedly address this gap. Encouraging such multidimensionality in well-being assessments moves beyond generalized packages of indicators and embraces complexity, to better reflect the conjoined, relationally coupled context of farmers.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s13593-024-00971-7>.

**Acknowledgements** We thank anonymous journal reviewers for insightful comments on our manuscript. We thank Erin Betley, Pua’ala Pascua, Amanda Sigouin, and Nadav Gazit of the American Museum of Natural History’s Center for Biodiversity. All authors express their heartfelt condolences for the loss of our co-author, Dr. Eleanor Sterling.

**Authors’ contributions** Conceptualization: MEI, SC, and ES. Methodology: MEI, TL, SC, and ES. Investigation: MEI, TL, SC, LS, KM, SP, AD, DR, YA-T, LV, OC, JL, and ES. Writing—original draft: MEI, TL, SC, ES. Writing—review and editing: MEI, TL, SC, LS, KM, SP, AD, DR, YA-T, LV, OC, JL, and ES. Funding acquisition: MEI and SC. Supervision: MEI, SC, and ES.

**Funding** This study was funded by the National Centre for Scientific Research (CNRS, France) through the Projet International de Coopération Scientifique (PICS), “Indicateurs de bien-être: une co-construction selon une approche bioculturelle” to S. Caillon (CNRS) and K. MacDonald (UoT), the Canada Research Chairs Program, and the Sustainable Food and Farming Futures Cluster, University of Toronto Scarborough to M.E. Isaac (UoT).

**Data availability** All data generated or analyzed during this study are included in this published article.

**Code availability** Not applicable.

## Declarations

**Ethics approval** Not applicable.

**Consent for publication** Not applicable.

**Competing interests** Marney E Isaac currently serves as an editor and asked to be blinded from the decision process of this manuscript.

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