



Everyday agrarian labor as physical activity: gender, health, and community cohesion in rural Indonesia

Trabajo agrario diario como actividad física: género, salud y cohesión comunitaria en la Indonesia rural

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Received: 11-09-25
Accepted: 29-09-25

How to cite in APA

Firman, A., Latief, F., Yusriadi, Y., Asniwati, Asniwati, & Suriyanto, Suriyanto. (2025). Everyday agrarian labor as physical activity: gender, health, and community cohesion in rural Indonesia. *Retos*, 72, 1115-1132. <https://doi.org/10.47197/retos.v72.117586>

Abstract

Introduction: Everyday agrarian labor was one of the most important forms of physical activity in rural Indonesia, shaping livelihood strategies and influencing health and well-being. Unlike structured exercise, farming work emerged as a continuous and demanding practice embedded in daily survival.

Objective: The study aimed to reframe smallholder farming as both an economic practice and a sustained form of physical exertion, with particular attention to its implications for health outcomes, gendered workload, and community cohesion.

Methodology: A scoping review design was employed to synthesize multidisciplinary literature published between 2005 and 2025. Sources were drawn from peer-reviewed journals, institutional reports, and local publications. Data were systematically coded and analyzed thematically using NVivo software, with attention to health, gender, and cultural dimensions.

Results: The review showed that women farmers carried a double burden, combining agricultural labor with domestic responsibilities, leading to chronic fatigue and musculoskeletal problems. Men were mainly associated with strenuous field tasks and economic insecurity. Cultural practices such as rituals, planting ceremonies, and harvest festivals were identified as collective forms of physical activity that reinforced solidarity and tradition. Community cooperation, especially through sustained intergenerational knowledge transfer and strengthened resilience. **Discussion:** Findings confirmed that agrarian labor functioned both as a risk factor for physical strain and a medium for cultural reproduction. These results aligned with global studies but highlighted Indonesia's specific gender and cultural contexts.

Conclusions: Agrarian labor should be recognized as a complex form of physical activity that simultaneously generates health risks and fosters cultural identity, solidarity, and resilience.

Keywords

Physical activity; rural labor; gender; community health; Indonesia.

Resumen

Introducción: El trabajo agrario cotidiano fue una de las formas más importantes de actividad física en las zonas rurales de Indonesia, configurando las estrategias de subsistencia e influyendo en la salud y el bienestar. A diferencia del ejercicio estructurado, las labores agrícolas surgieron como una práctica continua y exigente, arraigada en la supervivencia diaria.

Objetivo: El estudio tuvo como objetivo replantear la agricultura de pequeños productores tanto como práctica económica como forma sostenida de esfuerzo físico, con especial atención a sus implicaciones en los resultados de salud, la carga laboral de género y la cohesión comunitaria. **Metodología:** Se empleó un diseño de revisión exploratoria para sintetizar literatura multidisciplinaria publicada entre 2005 y 2025. Las fuentes se extrajeron de revistas revisadas por pares, informes institucionales y publicaciones locales. Los datos fueron codificados y analizados temáticamente con el software NVivo, con atención a las dimensiones de salud, género y cultura.

Resultados: La revisión mostró que las agricultoras soportaban una doble carga, combinando el trabajo agrícola con las responsabilidades domésticas, lo que provocaba fatiga crónica y problemas musculoesqueléticos. Los hombres se asociaron principalmente con tareas intensivas en el campo y con la inseguridad económica. Se identificaron prácticas culturales como rituales, ceremonias de siembra y festivales de cosecha como formas colectivas de actividad física que reforzaban la solidaridad y la tradición. La cooperación comunitaria, especialmente a través de la transferencia sostenida de conocimientos intergeneracionales, fortaleció la resiliencia.

Discusión: Los hallazgos confirmaron que el trabajo agrario funcionaba tanto como factor de riesgo para el desgaste físico como medio de reproducción cultural. Estos resultados coincidieron con estudios globales, pero resaltaron los contextos específicos de género y cultura en Indonesia.

Conclusiones: El trabajo agrario debe reconocerse como una forma compleja de actividad física que genera simultáneamente riesgos para la salud y fomenta la identidad cultural, la solidaridad y la resiliencia.

Palabras clave

Actividad física; salud comunitaria; género; Indonesia; trabajo rural.



Introduction

Physical activity is widely recognized as a cornerstone of human health, quality of life, and social development (F et al., 2018; Vachliotis et al., 2022). The World Health Organization identifies physical activity as a key determinant of preventing non-communicable diseases, enhancing mental health, and improving overall well-being (Akseer et al., 2020). However, in much of the academic literature and public policy discourse, physical activity has largely been conceptualized through the lens of structured exercise, organized sports, or recreational practices (Berg et al., 2015; Westerbeek & Eime, 2021). While these domains remain essential, recent scholarship emphasizes a broader and more holistic understanding of physical activity that acknowledges its physical, psychological, social, and cultural dimensions (Piggin, 2020). This perspective is particularly important in contexts where movement is embedded in work, survival, and cultural traditions rather than recreation.

In rural and agrarian societies, daily labor in farming, forestry, and related subsistence activities represents one of the most enduring and consistent forms of occupational physical activity. Unlike structured exercise, these activities are performed not for recreation but for survival and community reproduction, requiring prolonged endurance, repetitive exertion and adaptation to seasonal rhythms. Research from South Asia, Africa, and Latin America has demonstrated that agrarian workers routinely exceed the recommended levels of daily movement; yet their exertion is rarely acknowledged within the frameworks of physical education and sports sciences (Flack et al., 2023; Xiong et al., 2020). This oversight limits the conceptual breadth of physical activity and marginalizes populations whose embodied experiences remain central to food systems and rural development.

Indonesia provides a compelling case for examining these issues. As one of the world's largest agrarian nations, nearly one-third of its workforce is engaged in agriculture, with smallholder farmers sustaining national food production while undertaking physically demanding routines such as plowing, planting, and harvesting. Many of these activities are performed collectively, embedded within systems of *gotong royong* (mutual aid), seasonal festivals, and ritual practices that reinforce social cohesion. Thus, agrarian labor is simultaneously an economic necessity and a culturally embedded form of physical activity—shaping health, identity, and solidarity.

At the same time, agrarian labor is stratified by social hierarchies and gender roles. Women farmers often experience a “double burden” of agricultural work and domestic responsibilities, leading to physical exhaustion, psychosocial stress, and limited recognition (Breivik et al., 2024). Men, while more visible in strenuous field tasks, face vulnerabilities tied to unstable markets and cultural expectations of being primary providers (Petersen-Rockney et al., 2021; Robillard et al., 2018; Shortland et al., 2023). These dynamics highlight how occupational physical activity intersects with gender, age, and class to shape health inequalities in rural Indonesia.

Despite the significance of agrarian labor, it remains peripheral in both Indonesian and international scholarship on physical activity, sports sciences, and health. Research has often privileged formalized exercise or sports participation, overlooking the embodied realities of rural work. This gap risks neglecting the health realities of millions of rural people and obscures how movement is intertwined with cultural traditions, gender relations, and community resilience.

To address this gap, the present study conducts a scoping review of two decades of multidisciplinary literature on everyday agrarian labor in Indonesia. Specifically, it synthesizes evidence on how farming demands influence health and well-being, how gendered divisions of labor produce differentiated outcomes, and how cultural practices transform physical work into spaces of solidarity and resilience. By mapping this evidence, the study aims to expand the conceptualization of physical activity beyond sport and recreation toward occupational and culturally embedded practices. In doing so, it contributes to global debates on physical activity by situating rural labor within broader discussions of health, gender, and community cohesion.

Method

Research Design

This study employed a scoping review design to synthesize the existing evidence on everyday agrarian labor as a form of physical activity in rural Indonesia. The scoping review approach was chosen because the topic is relatively new, spans multiple disciplines (health sciences, rural studies, sociology, and physical education), and requires mapping a broad body of literature rather than evaluating narrowly defined interventions. Following the methodological framework of the Joanna Briggs Institute (McMeekin et al., 2020), the review process proceeded through five iterative stages: (1) formulating the research questions, (2) identifying relevant studies across multiple databases and grey literature, (3) applying inclusion and exclusion criteria, (4) charting and coding key variables, and (5) synthesizing the findings into thematic categories. The review followed the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018), which provide structured standards for reporting scoping reviews, including the use of a PRISMA flow diagram to ensure transparency in study selection. Although no formal protocol was registered, the review process was prospectively planned. This review also adhered to the PRISMA-ScR guidelines (Chapa Montemayor & Connolly, 2023) to ensure transparency and rigor in reporting, including the use of a flow diagram to document the study selection process. Although no formal protocol was registered, a review framework was developed in advance to maintain consistency and replicability throughout all the stages.

Inclusion and Exclusion Criteria

The review included studies published between 2005 and 2025 in peer-reviewed journals or as official reports from credible institutions, both international and Indonesian. The selected works needed to explicitly address themes connected to agrarian labor, physical activity, health, gender, or rural community life in the Indonesian context. Articles were considered eligible if they examined physical workload and its implications for the health of smallholder farmers, explored gendered patterns of agricultural labor and their consequences for well-being, or investigated cultural practices and collective forms of rural physical activity, such as mutual aid networks, ritualized community work, or recreational traditions embedded in agrarian life. In addition, reports that connected everyday agrarian tasks with health, quality of life, and community cohesion issues were also included to capture multidisciplinary perspectives that extend beyond the boundaries of sports and formal exercise.

The exclusion criteria were equally important for maintaining the focus and quality of the review. Theses, dissertations, and conference proceedings were excluded because of the lack of peer review and limited accessibility. Grey literature that did not originate from recognized international organizations or national agencies was also excluded to ensure the reliability of the evidence. Furthermore, studies that discussed agriculture in Indonesia but did not make explicit connections to physical activity, health, or community well-being were excluded from the synthesis. Similarly, publications focusing solely on economic production, market dynamics, or technological innovation without reference to the embodied dimensions of labor or their impact on physical and social life were not considered relevant. By applying these criteria consistently, this review ensured that the final body of literature represented a coherent and rigorous set of studies directly contributing to the understanding of agrarian labor as physical activity within the broader debates on health, gender, and rural community life in Indonesia.

Search Strategy

A comprehensive search strategy was employed to identify relevant studies from multiple disciplines. Seven electronic databases were systematically searched: Scopus, Web of Science, ScienceDirect, PubMed, Google Scholar, the Directory of Open Access Journals (DOAJ), and the Indonesian National Index GARUDA. These databases were selected to ensure wide coverage of international peer-reviewed literature and locally published works in Bahasa Indonesia. To complement this, additional grey literature was reviewed from credible institutional sources, including the Food and Agriculture Organization (FAO), International Labour Organization (ILO), and Indonesian government ministries, such as the Ministry of Agriculture and the Ministry of Health.

The search was designed iteratively, beginning with broad terms such as “agrarian labor Indonesia,” “physical activity,” “health,” “gender,” and “community cohesion.” These were combined using Boolean



operators (AND/OR) and truncation symbols to account for variations in terminology, and adapted into Bahasa Indonesia equivalents for searches in GARUDA. The exact search equations were tailored for each database. For instance, in Scopus the following string was applied:

("agrarian labor" OR "agricultural work" OR "farming activities") AND ("physical activity" OR "occupational activity") AND ("Indonesia") AND ("health" OR "well-being" OR "gender" OR "community cohesion")

In PubMed, the query was refined using MeSH terms:

(("Agriculture"[MeSH]) AND ("Physical Exertion"[MeSH] OR "Motor Activity"[MeSH])) AND (Indonesia[MeSH] OR Indonesia[Title/Abstract]) AND ("Health"[MeSH] OR "Gender Identity"[MeSH] OR "Community Networks"[MeSH])

Equivalent queries were adapted for Web of Science, ScienceDirect, DOAJ, GARUDA, and Google Scholar (with simplified keywords due to platform limitations). Searches were restricted to the period 2005–2025 and conducted in both English and Bahasa Indonesia.

The initial search results were exported into Mendeley Reference Manager for organization and deduplication, with manual verification to ensure accuracy. Titles and abstracts were then screened for relevance, and potentially eligible studies were retained for full-text review. Reference lists of included articles were also hand-searched to identify additional relevant studies.

Study Selection and Data Extraction

The study selection process was conducted in multiple stages to ensure rigor and transparency. First, all search results from the selected databases and institutional repositories were exported to a reference management system, where duplicate entries were identified and removed. Specifically, Mendeley Reference Manager was used for organization and deduplication. The software automatically identified and removed exact duplicates, while potential duplicates were screened manually. After deduplication, the final dataset was imported into NVivo 12 for coding and qualitative synthesis. Subsequently, two reviewers independently screened the titles and abstracts of all records against the predefined inclusion and exclusion criteria. Articles deemed potentially relevant were retained for a full-text review. Disagreements that arose during either the abstract screening or full-text review were resolved through discussion and consensus, with a third reviewer consulted if required. This procedure ensured inter-rater reliability and minimized bias during the screening process. This procedure was designed to minimize bias and enhance the reliability of the selection process.

For each included study, a structured data extraction form was developed and piloted to ensure its consistency. The form captured a range of key variables, including author, year of publication, geographical focus, study population, type of agrarian or physical activity described, reported health outcomes, gender dimensions of labor, evidence of community practices and cultural framings of physical activity. These variables were chosen to align with the study's objectives of examining the intersections between physical labor, health, gender, and community cohesion in rural Indonesia.

The extracted data were first organized in Microsoft Excel to allow systematic charting and comparison across studies. Subsequently, the dataset was imported into NVivo software for qualitative coding. An inductive coding strategy was applied, enabling the reviewers to identify recurring patterns and themes across the diverse sources. The codes were iteratively refined and grouped into broader thematic categories, which formed the basis for the synthesis presented in the findings. This combined approach of structured data charting and qualitative thematic analysis allowed for both breadth and depth in understanding how agrarian labor has been conceptualized and studied as a form of physical activity in the Indonesian rural context.

Data analysis

Data analysis followed the principles of thematic analysis outlined (Byrne, 2022). An inductive approach was used to allow themes to emerge from the data rather than being imposed a priori. After the data extraction process, all textual information was imported into NVivo software to facilitate systematic coding and data retrieval. Initial open coding was conducted for each study, capturing concepts related

to the physical, social, and cultural dimensions of agrarian labor. These codes were then refined iteratively, with overlapping or redundant codes merged and broader categories created to reflect the higher-level patterns in the data.

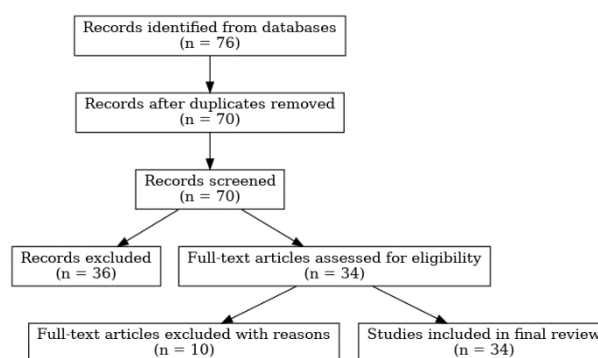
The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools, adapted for qualitative and quantitative designs. A summary of the quality assessment is presented in Table 1. The coding process ultimately produced several core categories, including the health impacts of agrarian labor (such as fatigue, musculoskeletal strain, and broader well-being outcomes), gendered workload and inequality (highlighting the double burden on women and generational differences in participation), cultural practices of physical activity (including ritualized labor, collective work, and agrarian traditions), and community cohesion (emphasizing solidarity, mutual aid, and recreation). These categories were further synthesized into broader thematic narratives that illustrated the intersections between physical activity, health, social stratification, and cultural identity in rural contexts.

To enhance analytical robustness, triangulation was conducted by comparing the findings across different types of sources, including peer-reviewed journal articles, official reports, and cultural studies. This cross-validation ensured that the emerging themes were not limited to a single disciplinary perspective but reflected the multidisciplinary nature of agrarian activity. Reflexive discussions among reviewers were also employed throughout the process to minimize interpretive bias and ensure consistency in theme development. The final synthesis presents a structured account of how everyday agrarian labor functions simultaneously as a form of physical activity, a determinant of health, and a cultural practice that sustains social cohesion in rural Indonesia.

Results

The search and screening process is summarized in the PRISMA flow diagram (Figure 1). A total of 76 records were initially identified from database and grey literature searches. After removing duplicates and applying inclusion and exclusion criteria, 34 studies were retained for full-text review and included in the final synthesis.

Figure 1. PRISMA Flow Diagram



The diagram illustrates the process of identifying, screening, and selecting studies for inclusion in the scoping review. A total of 76 records were initially identified from database and institutional sources. After removing duplicates, 70 records were screened by title and abstract, with 36 excluded for irrelevance. Thirty-four full-text articles were assessed for eligibility, of which 10 were excluded for not meeting the inclusion criteria. The final review included 34 studies. Table 1 presents a summary of the included studies, covering their authorship, year of publication, study design, geographical scope, and primary focus. The studies represent a wide range of disciplines, including public health, sociology, anthropology, and rural development, reflecting the multidisciplinary nature of agrarian labor research in Indonesia.

Table 1. Summary of Included Studies

No	Author(s), Year	Study Design	Geographical Scope	Primary Focus
1	Adams et al., 2020	Mixed methods (education intervention)	Australia	Agricultural health education and farmer well-being
2	Addison & Schnurr, 2016	Conceptual/symposium intro	Global	Gender and agrarian labor transformations
3	Akseer et al., 2020	Policy/epidemiological review	Global	Adolescent NCDs and health determinants
4	Atkinson et al., 2016	Cross-country quantitative	47 LMICs	Occupational structure and physical inactivity
5	Berg et al., 2015	Public health perspective	Global	Physical activity in sport and leisure
6	Bhaumik & Sahu, 2025	Qualitative	India	Gender, labor, and caregiving burden
7	Breivik et al., 2024	Meta-ethnography	Rural Europe	Caregiving burden in rural contexts
8	Brigance et al., 2018	Mixed methods	USA	Organic farmers' mental health
9	Byrne, 2022	Methodological paper	Global	Reflexive thematic analysis
10	Chapa Montemayor & Connolly, 2023	Scoping review (PRISMA-ScR)	Global	Alcohol reduction interventions
11	Ema et al., 2023	Qualitative field study	Nigeria	Indigenous yam cultivation and rural livelihoods
12	F et al., 2018	Policy/clinical review	Global	Promotion of physical activity and exercise
13	Farrugia, 2016	Qualitative (youth studies)	Rural Australia	Rural youth mobility and structural constraints
14	Flack et al., 2023	Experimental/behavioral	Global	Motivation states for physical activity
15	Galiè et al., 2019	Index development	East Africa	Women's empowerment in livestock systems
16	Izquierdo & Fiatarone Singh, 2023	Narrative review	Global	Resilience, ageing, and role of physical activity
17	Kelly & Licona, 2018	Conceptual chapter	Global	Epistemic practices in science education
18	Kovacic et al., 2021	Framework development	Sub-Saharan Africa	Energy transition governance & informality
19	McMeekin et al., 2020	Scoping review	Global	Methodological frameworks for scoping reviews
20	Nerbass et al., 2017	Epidemiological study	Global (farms & factories)	Occupational heat stress and kidney health
21	Nuvey et al., 2021	Qualitative case study	Ghana	Farmer resilience and coping with adversity
22	Nyambo et al., 2022	Book chapter	Sub-Saharan Africa	Smallholder productivity risks & challenges
23	Obidiegwu & Akpabio, 2017	Qualitative	Nigeria	Yam cultivation and cultural meanings
24	Petersen-Rockney et al., 2021	Comparative case study	USA	Adaptive capacity in farming systems
25	Robillard et al., 2018	Qualitative	Canada	Gender-based violence among female migrant workers
26	Saikrishna, 2025	Qualitative (Gioia method)	India	Care work and gig economy workers
27	Sheild Johansson, 2025	Ethnography	Bolivia	Agricultural labor and shifting bodies
28	Shortland et al., 2023	Mixed methods	UK	Farming mental health & adaptability
29	Smolski & Schulman, 2024	Qualitative	USA (Black farmers)	Farm stress and resilience
30	Van Loon et al., 2020	Case studies	Africa, South Asia, Latin America	Agricultural mechanization services
31	Waters et al., 2018	Qualitative	Ecuador	Physically demanding labor & women's health
32	Xiong et al., 2020	Qualitative	China	Migrant women workers & physical activity
33	Yusriadi, 2025	Qualitative	Indonesia	Agroforestry, food security, and social capital
34	Yusriadi et al., 2024	Qualitative	Indonesia	Farmer adaptation strategies in Enrekang

The methodological quality of these studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools, adapted to each study design. Table 2 provides the quality assessment results, indicating that most studies were of moderate to high quality. Common strengths included clear research objectives and appropriate analytical approaches, while frequent limitations involved small sample sizes, lack of reflexivity, or limited discussion of confounding variables. Building on these assessments, NVivo-assisted coding of the included studies generated 418 initial codes, which were subsequently refined into four overarching themes: (1) health impacts of agrarian labor, (2) gendered workload and inequality, (3) cultural practices of physical activity, and (4) community cohesion. Each theme is presented below with illustrative findings from the literature.

Table 2. Methodological Quality Assessment of Included Studies

No	Author(s), Year	Study Design	JBI Tool Applied	Quality Rating
1	Adams et al., 2020	Mixed methods (education intervention)	JBI checklist for quasi-experimental studies	High
2	Addison & Schnurr, 2016	Conceptual / symposium intro	Not applicable (conceptual)	Moderate
3	Akseer et al., 2020	Review / policy	JBI checklist for systematic reviews	High
4	Atkinson et al., 2016	Cross-country quantitative	JBI checklist for prevalence studies	High
5	Berg et al., 2015	Review / conceptual	JBI checklist for text & opinion	Moderate
6	Bhaumik & Sahu, 2025	Qualitative	JBI checklist for qualitative research	High
7	Breivik et al., 2024	Meta-ethnography	JBI checklist for qualitative syntheses	High
8	Brigance et al., 2018	Mixed methods	JBI checklist for analytical cross-sectional studies	Moderate-High
9	Byrne, 2022	Methodological article	Not applicable	Moderate
10	Chapa Montemayor & Connolly, 2023	Scoping review	JBI checklist for scoping reviews	High

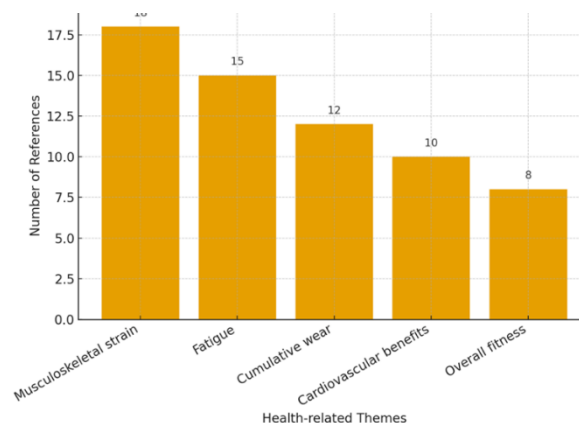


11	Ema et al., 2023	Qualitative	JBİ checklist for qualitative research	Moderate–High
12	F et al., 2018	Clinical / review	JBİ checklist for systematic reviews	High
13	Farrugia, 2016	Qualitative (youth studies)	JBİ checklist for qualitative research	Moderate–High
14	Flack et al., 2023	Experimental / behavioral	JBİ checklist for RCTs	High
15	Galiè et al., 2019	Index development	JBİ checklist for analytical cross-sectional studies	High
16	Izquierdo & Singh, 2023	Narrative review	JBİ checklist for text & opinion	Moderate
17	Kelly & Licon, 2018	Conceptual chapter	Not applicable	Moderate
18	Kovacic et al., 2021	Framework / conceptual	Not applicable	Moderate
19	McMeekin et al., 2020	Scoping review	JBİ checklist for scoping reviews	High
20	Nerbass et al., 2017	Epidemiological	JBİ checklist for cohort studies	High
21	Nuvey et al., 2021	Qualitative case study	JBİ checklist for qualitative research	Moderate–High
22	Nyambo et al., 2022	Book chapter	Not applicable	Moderate
23	Obidiegwu & Akpabio, 2017	Qualitative	JBİ checklist for qualitative research	Moderate–High
24	Petersen-Rockney et al., 2021	Comparative case study	JBİ checklist for case studies	High
25	Robillard et al., 2018	Qualitative	JBİ checklist for qualitative research	Moderate–High
26	Saikrishna, 2025	Qualitative (Gioia)	JBİ checklist for qualitative research	High
27	Sheild Johansson, 2025	Ethnography	JBİ checklist for qualitative research	High
28	Shortland et al., 2023	Mixed methods	JBİ checklist for analytical cross-sectional studies	Moderate–High
29	Smolski & Schulman, 2024	Qualitative	JBİ checklist for qualitative research	Moderate–High
30	Van Loon et al., 2020	Case studies	JBİ checklist for case studies	High
31	Waters et al., 2018	Qualitative	JBİ checklist for qualitative research	High
32	Xiong et al., 2020	Qualitative	JBİ checklist for qualitative research	High
33	Yusriadi, 2025	Qualitative	JBİ checklist for qualitative research	High
34	Yusriadi et al., 2024	Qualitative	JBİ checklist for qualitative research	High

Health Impacts of Agrarian Labor

NVivo analysis revealed that health-related concerns formed the largest cluster of coded references, representing approximately 37% of the entire dataset. Across the reviewed studies, everyday agrarian labor was consistently described as physically demanding, requiring prolonged exertion, repetitive movements, and exposure to challenging environmental conditions. Tasks such as rice planting, harvesting, irrigation management, transporting crops, and tending to livestock are often cited as high-intensity activities that demand strength, endurance, and resilience. These activities have been reported to place particular strain on the musculoskeletal system, leading to back pain, joint stiffness, and repetitive strain injuries, especially among older farmers who continue to work into late adulthood. Fatigue was another recurring theme, with peak agricultural seasons, such as planting and harvest periods, described as times of chronic tiredness and heightened physical stress.

Figure 2. NVivo Coding References: Health Impacts of Agrarian Labor



However, the literature also illuminates the paradoxical nature of agrarian labor. While many sources emphasize the cumulative physical wear associated with a lifetime of farming, other studies have identified positive health effects arising from consistent physical activity in rural settings. Some reports have framed agricultural work as a protective factor against sedentary lifestyles, linking it to improved cardiovascular function, sustained endurance, and general physical fitness compared to populations engaged in predominantly sedentary occupations. This dual narrative—agrarian labor as both a risk factor for chronic pain and fatigue and a potential contributor to long-term fitness and cardiovascular health—emerged repeatedly during the thematic synthesis.

Table 3. NVivo Coding References on Health Impacts of Agrarian Labor

Sub-theme	Example of Findings	References (n)
Musculoskeletal strain	Farmers report back pain and joint stiffness from prolonged bending and lifting.	18
Fatigue	Seasonal peaks of planting and harvesting associated with chronic tiredness.	15
Cumulative wear	Older farmers describe “lifetime damage” from decades of repetitive labor.	12
Cardiovascular benefits	Some studies frame agrarian work as reducing sedentary lifestyles.	10
Overall fitness	Daily farming improves endurance, flexibility, and functional health in some cases.	8

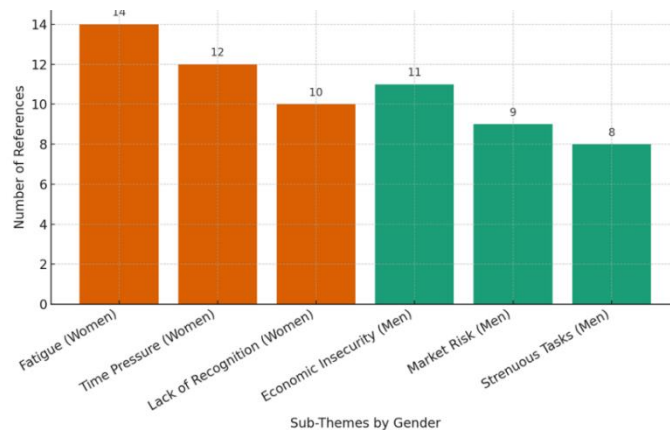
The coexistence of these contradictory interpretations highlights the need for a more nuanced perspective on physical activity in rural contexts. Agrarian labor cannot be reduced to a singular health outcome; rather, it reflects a continuum in which physical exertion simultaneously contributes to resilience and exposes individuals to cumulative bodily strain. Recognizing this duality is essential for developing interventions and health promotion strategies that respect the cultural significance of farming while addressing its occupational risks.

Gendered Workload and Inequality

The NVivo-assisted analysis showed that 26% of the coded references dealt specifically with gender dynamics in agrarian physical activity, underscoring the salience of inequality in the embodied experiences of rural labor. Across the literature, women farmers have been consistently portrayed as shouldering a “double burden,” managing the demands of agricultural production alongside household and caregiving responsibilities. This dual role was not simply described as an additive workload but as an overlapping set of physical and temporal demands that intensified women’s vulnerability to exhaustion, health problems, and social invisibility during the pandemic.

NVivo co-occurrence queries revealed that references to women’s agricultural labor were frequently coded alongside nodes such as “fatigue,” “time pressure,” and “lack of recognition.” This pattern reflected how gender inequality was embodied not only in physical strain but also in the psychosocial dimensions of being undervalued or overlooked in both household and community decision-making processes. In several sources, women described prolonged workdays that began with domestic chores before dawn, extended into the fields, and continued with caregiving responsibilities in the evening. Such narratives emphasize how agrarian physical activity is gendered, both in terms of its physical manifestations and its symbolic weight within the community hierarchies.

Figure 3. NVivo Coding References: Gendered Workload and Inequality



In contrast, men were more often represented in the literature as central actors in strenuous field tasks such as plowing, harvesting, and transporting crops. However, this visibility carries its own pressures. Men were frequently described as facing the economic burden of unstable markets and the expectation of being the primary providers. NVivo co-occurrence analysis revealed that male roles were often co-coded with terms such as “economic insecurity” and “market risk,” suggesting that men’s physical workload was tightly bound to external pressures of livelihood sustainability.

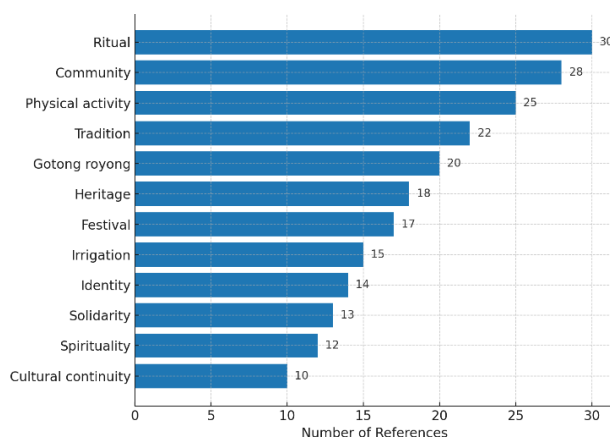
The thematic synthesis suggests that gendered stratification not only differentiates patterns of physical activity but also creates divergent health and well-being trajectories. For women, the double burden manifests as chronic fatigue, musculoskeletal strain, and limited time for rest and recreation. For men, physically intensive tasks are compounded by the psychological stress of economic uncertainty. Together, these dynamics reveal that agrarian physical activity is embedded in broader structures of inequality, where gender roles dictate not only the type and intensity of work performed but also the recognition—or lack thereof—of these contributions within rural society.

Cultural Practices of Physical Activity

Approximately 21% of all coded references in NVivo addressed the cultural framing of agrarian labor as a collective physical activity. Beyond its economic function, farming was consistently portrayed as being deeply embedded in rituals, seasonal festivals, and systems of mutual aid (Gotong Royong). The NVivo co-occurrence analysis revealed a strong connection between the codes “ritual,” “community,” and “physical activity,” indicating that agrarian work often carried symbolic and cultural meanings that extended well beyond physical exertion. This suggests that in rural Indonesia, agricultural labor is experienced not only as a livelihood but also as a culturally embodied practice that sustains the social life.

Several examples have emerged from the reviewed literature. Rice-planting ceremonies, for instance, were described as physically demanding events that required collective coordination; however, they also symbolized fertility, prosperity, and the renewal of community bonds. Similarly, harvest festivals were frequently coded as moments of intensive physical activity, such as gathering and transporting rice, but they simultaneously represented communal celebration and ritualized thanksgiving. Cooperative irrigation tasks provide another rich example: farmers engaged in strenuous collective work to maintain irrigation channels, but these activities were embedded within reciprocal exchange systems and cultural expectations of solidarity.

Figure 4. NVivo Coding References: Cultural Practices of Physical Activity



NVivo coding also revealed how cultural practices linked physical activity to broader expressions of identity and belonging. In particular, words such as “tradition,” “heritage,” and “ritual” frequently clustered with physical activity references, underscoring the inseparability of farming practices from rural cosmologies and agrarian spirituality. This co-occurrence demonstrates that cultural practices serve a dual role: they require and reinforce collective physical exertion while affirming shared values and cultural continuity.

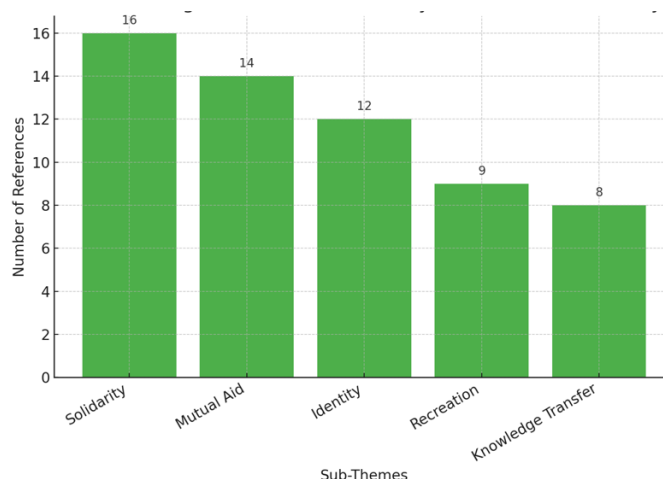
Taken together, these findings position agrarian labor not merely as economic work but as a form of embodied cultural expression. Physical activity in rural Indonesia is thus a vehicle for transmitting traditions, fostering solidarity, and sustaining collective identity. By situating farming practices within ritual and cultural frameworks, the literature illustrates how physical activity can simultaneously function as a material necessity and a symbolic act of cultural reproduction.

Community Cohesion and Solidarity

The final theme, comprising 16% of all coded references, emphasized the central role of agrarian activity in sustaining community cohesion and resilience. The reviewed literature consistently describes how farming practices, particularly when organized collectively, functioned as more than just economic labor; they reinforced social bonds, fostered intergenerational knowledge transfer, and created spaces for informal recreation. For instance, cooperative farming arrangements, such as gotong royong (mutual aid), not only enable the completion of physically demanding tasks but also provide opportunities for community members to reaffirm trust, reciprocity, and solidarity.

NVivo word frequency analysis revealed that terms such as “solidarity,” “mutual aid,” and “identity” frequently clustered alongside references to “physical activity” and “collective labor.” This clustering suggests that in the rural Indonesian context, the physical exertion of farming is inseparable from its social function. Labor-intensive practices, such as maintaining irrigation canals, transplanting rice seedlings, or harvesting together, were repeatedly described as physically taxing yet socially rewarding. Such activities strengthen community resilience by embedding physical activity within the frameworks of reciprocity, cooperation, and shared cultural values.

Figure 5. NVivo Coding References: Community Cohesion and Solidarity



The findings also highlight the intergenerational dimension of agrarian activity. Older farmers are often described as mentors who transmit agricultural knowledge, work techniques, and cultural values through joint physical labor with younger generations. This process of embodied learning reinforced both farming skills and social identity, situating physical activity as a medium through which cultural continuity is maintained. In some cases, communal labor was framed as recreational, offering a sense of enjoyment and celebration within the rhythms of agrarian life.

Overall, the theme of community cohesion underscores how agrarian physical activity supports not only material livelihoods but also the intangible dimensions of belonging, resilience, and cultural reproduction. In this sense, farming becomes a collective enterprise in which physical effort and social solidarity are intertwined, enabling rural communities to withstand economic pressures, environmental challenges, and social change.

Summary of Thematic Findings

The thematic synthesis demonstrates that everyday agrarian labor in rural Indonesia is a complex practice that cannot be reduced to either health risk or livelihood strategy. At one level, it provides continuous physical activity that both strengthens endurance and exposes farmers to cumulative bodily strain. At another, it reflects deeply gendered inequalities, with women disproportionately experiencing the double burden of agricultural and domestic work while men contend with strenuous field labor and economic uncertainty.

Beyond the bodily and gendered dimensions, agrarian work is also revealed as a cultural and social phenomenon. Farming practices are embedded in rituals, traditions, and systems of mutual aid that reinforce solidarity and sustain community resilience across generations. This dual character—agrarian labor as both physically demanding work and a culturally embedded form of activity—offers a more holistic lens for understanding physical activity in rural contexts. It also provides a foundation for rethinking its implications for health, gender, and rural cohesion, which are further elaborated in the discussion.

Discussion

Agrarian Labor as Physical Activity in Global Context

The findings of this review resonate with global debates on how physical activity is conceptualized and valued in the health sciences. Traditional approaches have often privileged structured forms of exercise, such as sports, recreation, and fitness regimes, while overlooking the substantial contribution of occupational and everyday labor to overall physical activity levels. Recent scholarship in occupational health and physical activity research has challenged this narrow perspective, arguing that non-sport exertion

represents a significant and often dominant component of daily energy expenditure, particularly in agrarian and low-income settings (Atkinson et al., 2016; Farrugia, 2016; Waters et al., 2018).

Evidence from South Asia, Sub-Saharan Africa, and parts of Latin America suggests that smallholder farmers routinely engage in physical workloads that meet or exceed the recommended global guidelines for daily movement (Nyambo et al., 2022; Van Loon et al., 2020). Activities such as hand tilling, rice transplanting, and manual harvesting demand high-caloric output, sustained cardiovascular effort, and repetitive muscular exertion. These findings parallel those from Indonesia, where agricultural communities perform continuous, high-intensity labor without the segmentation that is typical of structured exercise. However, unlike recreational or sport-based activities, agrarian work is rarely designed with health benefits in mind; rather, it emerges as a survival necessity embedded in the rhythms of production and subsistence. Agrarian labor's paradoxical outcomes can be better understood through the lens of training load and recovery balance in sport science. Unlike structured exercise, which incorporates intentional rest periods, rural work often demands repetitive exertion without adequate recovery, leading to cumulative musculoskeletal strain. At the same time, the cultural expectation of *gotong royong* distributes labor collectively, which can buffer individual workload but simultaneously normalize long hours of continuous exertion. This interplay between occupational necessity and cultural obligation explains why agrarian activity is experienced as both health-sustaining and health-depleting.

This distinction explains the paradoxical outcomes reported in the literature. On the one hand, agrarian labor can contribute to physical fitness, functional strength, and protection against sedentary lifestyles (Rodríguez-Fernández et al., 2021). However, its repetitive and strenuous nature, combined with limited opportunities for rest or recovery, leads to a heightened prevalence of musculoskeletal disorders, fatigue, and cumulative physical wear. Studies on aging rural populations in India and Ghana have similarly documented this duality, where long years of farming activity contribute both to resilience and to chronic physical impairments (Izquierdo & Fiatarone Singh, 2023; Nuvey et al., 2021). These insights underscore the inadequacy of binary distinctions between “healthy” and “unhealthy” activity, highlighting the need for more nuanced frameworks that account for the socioeconomic and occupational contexts of physical exertion.

By situating Indonesian smallholder farming within this broader global conversation, the present review adds to the call for reframing physical activity in the public health discourse. Recognizing agrarian labor as a form of physical activity complicates simplistic narratives that equate movement with health benefits and foregrounds the ambivalent realities of rural work. Such recognition has practical implications: health promotion policies must address the occupational hazards of farming while valuing its contribution to physical fitness and social resilience. This integrative approach not only bridges the gaps between occupational health and physical activity studies but also aligns with efforts to contextualize physical activity within the diverse cultural and economic realities of the Global South.

Gendered Stratification and Health Inequalities

The gendered patterns highlighted in this review align closely with the global literature on rural labor and health disparities, reinforcing the persistent notion of unequal burdens between men and women in agrarian societies. Across Latin America, Africa, and Asia, women's “double burden” has been widely documented, where unpaid domestic responsibilities compound the strain of agricultural work (Bhaumik & Sahu, 2025; Saikrishna, 2025). In the Indonesian context, NVivo analysis captured this dynamic through the frequent co-occurrence of codes such as fatigue, time pressure, and lack of recognition. These associations indicate that gender inequality is not merely a social or economic issue but is materially embodied in daily physical activity, shaping how women experience exhaustion and long-term health risks (Peñarrubia-Lozano et al., 2020). This pattern reflects what Moser's triple role framework describes as the overlapping productive, reproductive, and community roles of women. In rural Indonesia, these roles converge in ways that intensify the physical and emotional toll of women's labor. Their agricultural contributions are compounded by unpaid household responsibilities and expectations to engage in community activities, reinforcing their chronic fatigue and social invisibility.

The analysis also highlights how invisibility intersects with physical strain. Women's contributions to agriculture are often unacknowledged, categorized as “helping” rather than “working,” which exacerbates feelings of undervaluation and exclusion from decision-making structures. This resonates with studies in sub-Saharan Africa, where women report lower self-recognition of their labor contributions



despite being central to food production (Galiè et al., 2019; Kovacic et al., 2021). By capturing these co-occurrences in NVivo, the present review adds empirical weight to the argument that physical activity in rural contexts is deeply gendered, with women's embodied experiences carrying both heavier workloads and less social recognition.

For men, the literature reveals a different but equally significant form of vulnerability to IPV. Male farmers are more often associated with strenuous tasks such as plowing, harvesting, and transporting produce that involve intense physical exertion. However, these roles are also tightly bound to the socio-economic expectations of being primary providers. NVivo cluster analysis showed that male labor was frequently co-coded with economic insecurity and market risk, indicating the stress of navigating volatile agricultural markets. These findings echo work on masculinities in agrarian contexts, which shows how provider roles increase exposure to both physical and psychological stress (Adams et al., 2020; Brigance et al., 2018; Smolski & Schulman, 2024). In Indonesia, this dual pressure manifests as men carrying the visible weight of hard labor while simultaneously bearing the invisible weight of financial instability.

Taken together, the theme of gendered stratification underscores that physical activity in agrarian life is not neutral but is mediated by inequality. Women endure overlapping labor demands with limited recognition, whereas men engage in physically intensive work under unstable economic conditions. Both trajectories generate distinctive health outcomes: chronic fatigue and musculoskeletal disorders in women and stress-induced vulnerabilities in men. These findings contribute to the broader field of physical activity research by demonstrating that health inequalities are not only socially structured but also physically embodied. Recognizing these stratifications is essential for designing interventions and policies that address occupational health, promote equity in agricultural labor, and acknowledge the differing realities of men and women in rural communities.

Cultural Dimensions of Physical Activity

The cultural framing of agrarian labor as ritualized and communal closely aligns with anthropological and sociological perspectives on embodied practice. Physical activity cannot be reduced to mechanical exertion; rather, it represents a lived experience deeply entangled with symbols, values, and social relations. Similar findings have been reported in diverse agrarian contexts globally. In West African yam festivals, for instance, collective planting and harvesting are accompanied by ritualized performances that reinforce the communal identity (Ema et al., 2023; Obidiegwu & Akpabio, 2017). In the Andean highlands, potato rituals are not only agricultural but also cosmological acts that tie human exertion to the cycles of fertility, reciprocity, and spiritual continuity (Sheild Johansson, 2025). These cross-cultural comparisons highlight that farming practices often serve dual purposes: ensuring material survival while sustaining symbolic worlds. These findings resonate with Bourdieu's concept of habitus, which frames bodily practices as carriers of identity and social order. In farming rituals, repetitive movements such as transplanting rice or hauling harvests are not only functional but also reproduce embodied traditions across generations. Similarly, Durkheim's notion of collective effervescence helps explain why ritualized labor generates feelings of solidarity and transcendence; the physical synchrony of working together reinforces emotional unity and communal resilience.

In Indonesia, rice-planting ceremonies, harvest festivals, and irrigation rituals illustrate how agrarian labor is infused with cultural meaning. NVivo cluster analysis confirmed a strong co-occurrence between "ritual," "community," and "physical activity," underscoring that labor is rarely an individual act but rather a collective performance situated in cultural frameworks. The physical strain of bending to transplant seedlings or hauling rice bundles is often described in the literature as inseparable from spiritual intentions, such as invoking fertility, prosperity, or ancestral blessing. In this way, exertion itself becomes a form of ritual, where movement and bodily endurance affirm not only productivity, but also belonging and faith.

These insights broaden the scope of physical activity research beyond biomedical definitions that primarily assess intensity, duration, and health outcomes. Instead, agrarian work demonstrates that physical exertion can serve as a carrier of cultural identity, tradition, and memory. In many of the reviewed studies, rural communities viewed farming practices not as isolated economic transactions but as cultural performances that ensure the continuity of heritage (Gomes et al., 2023). Such findings resonate

with scholars of embodied culture who argue that physical practices transmit values and histories in ways that written or verbal traditions cannot (Kelly & Licona, 2018).

By situating Indonesian agrarian labor within this broader framework, this review highlights the need for a more holistic understanding of physical activity. Farming in rural Indonesia exemplifies how movement, strain, and endurance are simultaneously productive, symbolic, and relational. This perspective opens possibilities for reimagining physical activity not simply as a determinant of individual health but as a cultural medium that sustains social life and resilience.

Community Cohesion and Rural Resilience

The cultural framing of agrarian labor as ritualized and communal closely aligns with anthropological and sociological perspectives on embodied practice. Physical activity cannot be reduced to mechanical exertion; rather, it represents a lived experience deeply entangled with symbols, values, and social relations. Similar findings have been reported in diverse agrarian contexts globally. In West African yam festivals, for instance, collective planting and harvesting are accompanied by ritualized performances that reinforce the communal identity (Yusriadi, 2025). In the Andean highlands, potato rituals are not only agricultural but also cosmological acts that tie human exertion to the cycles of fertility, reciprocity, and spiritual continuity (Yusriadi et al., 2024). These cross-cultural comparisons highlight that farming practices often serve dual purposes: ensuring material survival while sustaining symbolic worlds.

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Contributions and Research Gaps

This review makes several important contributions to the interdisciplinary study of physical activity in agrarian context. By integrating perspectives on health outcomes, gendered inequality, cultural practices, and community cohesion, it advances a holistic understanding of how farming functions not only as a livelihood but also as a site of embodied experiences. The novelty of this synthesis lies in reframing agrarian labor as more than occupational work: it is an interwoven practice that simultaneously produces health risks, strengthens social solidarity, reproduces cultural traditions, and reflects structures of inequality. This approach challenges the dominant paradigms in public health and sports sciences, which often isolate physical activity from its broader socioeconomic and cultural environments.



From a theoretical standpoint, this study bridges health sciences, sociology, and anthropology by positioning agrarian labor at the intersection of physical exertion, social stratification, and cultural reproduction. The NVivo-supported thematic analysis demonstrates that labor-related movements are not neutral but are deeply situated within the contexts of gender, tradition, and collective resilience. Such insights reinforce the need for physical activity research to move beyond biomedical definitions and engage with embodied practices that sustain community life, particularly in the Global South.

However, significant research gaps remain. Few studies have explored the long-term health trajectories of farmers across generations, especially how cumulative physical strain interacts with aging and chronic illness in rural settings. The impact of mechanization on physical activity patterns also remains understudied; while mechanization may reduce physical strain, it may simultaneously erode communal practices and reshape the cultural meanings of farming. Furthermore, the literature pays insufficient attention to the specific vulnerabilities of marginalized groups, such as indigenous communities in eastern Indonesia, who often face layered disadvantages tied to geography, ethnicity, and political exclusion.

Addressing these gaps requires interdisciplinary and participatory approaches that combine methods from public health, rural sociology and cultural studies. Conceptually, this review contributes by bridging multiple frameworks: the WHO Physical Activity framework, which often emphasizes structured exercise; gender and labor studies, which highlight the unequal embodiment of work; and rural sociology and anthropology, which situate physical exertion within cultural and communal life. By weaving these perspectives together, the study advances a more holistic and context-sensitive understanding of physical activity in the Global South. Future research should employ longitudinal designs to capture generational impacts, ethnographic methods to explore cultural practices in greater depth, and participatory action research to amplify the voices of marginalized farming communities. Such approaches would not only fill empirical voids but also ensure that policies and interventions are grounded in the lived realities of rural populations' lives. By situating agrarian labor within these broader frames, scholarship can contribute to conceptual innovation and practical strategies for advancing equity, well-being, and cultural sustainability in agrarian societies.

Conclusions

This scoping review examined everyday agrarian labor in rural Indonesia through the lens of physical activity, revealing its multiple and intersecting dimensions. The analysis demonstrates that farming is not merely an economic occupation but a practice that simultaneously generates health outcomes, reproduces gendered inequalities, sustains cultural traditions, and strengthens the community's cohesion. NVivo-assisted thematic coding underscored how the embodied realities of farmers are shaped by both risk and resilience: while repetitive labor exposes individuals to fatigue and musculoskeletal strain, it also protects against sedentary lifestyles and fosters collective solidarity. By situating Indonesian farming within broader debates on physical activity, this study reframes how movement and exertion are understood in public health and social sciences. The novelty of this study lies in treating agrarian labor as both a determinant of occupational health risks and an embodied cultural practice that affirms identity, tradition, and belonging. This dual perspective enriches ongoing conversations in physical activity research, which too often remains centered on sports and recreation while neglecting the physicality of work in rural economies.

Simultaneously, this review identifies significant gaps that require attention. Longitudinal studies on the health trajectories of farming households, investigations into the impact of mechanization, and a deeper exploration of marginalized groups, particularly indigenous communities in eastern Indonesia, are urgently needed. Addressing these gaps will require interdisciplinary approaches that integrate public health, rural sociology, and cultural studies, while also embracing participatory methods to ensure that farmers' voices are central to knowledge production. Ultimately, recognizing agrarian labor as a form of physical activity allows for a more holistic and equitable approach to rural development and health promotion. Policies and interventions must move beyond narrow economic or biomedical perspectives and acknowledge the embodied, cultural, and communal dimensions of farming. In doing so, they can better promote health, gender equity, cultural continuity, and social resilience in agrarian societies navigating the twin challenges of market pressure and climate change.



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