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ARTICLE

Characteristics and Attitudes Towards Food Safety Among Small-Scale Farmers in Santiago Metropolitan Region, Chile

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ABSTRACT

This study surveyed 80 small-scale vegetable farmers in Chile's Santiago Metropolitan Region to investigate their characteristics, attitudes, and knowledge concerning food safety. The findings indicate that the surveyed farmers largely rely on informal sales channels, where buyers typically do not mandate food safety compliance. Although 65% of farmers reported following Good Agricultural Practices (GAP), only a small fraction held formal certifications, revealing a notable disparity between perceived and actual adherence. A prevalent misconception was identified, with 60% of farmers incorrectly believing GAP and food safety to be synonymous. This divergence can be partially explained by the farmers' heavy reliance on informal sales channels. Farmers generally expressed confidence in their production systems to deliver safe products and were satisfied with their pest, disease, weed control, and irrigation techniques. However, they displayed less assurance regarding agrochemical residue management, record-keeping, and product preservation. While acknowledging the need to evolve beyond traditional farming methods, farmers viewed GAP implementation as requiring substantial investment. A multivariate analysis revealed the existence of two distinct farmer groups, delineated by their attitudes towards food safety, market orientation, and perceived benefits of integration into the formal economy. Commercially oriented farmers using conventional agriculture showed a heightened awareness of the challenges in implementing GAP. Conversely, those focused on self-consumption and organic farming tended to underestimate these difficulties. The study underscores the urgent need for targeted public policies to bridge the gap between farmers' current practices and formal food

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safety standards, addressing technical resource gaps, clarifying conceptual ambiguities, and fostering market opportunities.

Keywords: Food safety; Small-Scale Farming; Attitudes; Santiago Metropolitan Region; Chile

1. Introduction

While small-scale farms comprise over two-thirds of global agricultural operations, they manage only about a tenth of the land. Conversely, the largest one percent of farms control seventy percent of agricultural land. Despite this disparity, small-scale farming contributes a third of the world's food production, with an even greater share in developing countries [1]. The practice of multi-cropping, encompassing vegetable growing, is prevalent in small-scale farming [2]. Although vegetable production plays a critical role in providing essential nutrition, farmers must navigate a range of challenges, with food safety being a primary concern [3]. Macro-level evidence indeed indicates that the impact of sanitary and phytosanitary requirements, including food safety standards, varies based on farmers' characteristics, like their size. Specifically, sectors with a high concentration of small-scale farmers are more susceptible to adverse impacts [4–6]. Despite their importance for food supply, especially in developing countries, small-scale farmers are constrained in their access to production assets, markets, financial services, extension and advisory services, and digitalization [7]. These constraints are likely to result in disadvantages in adapting to food safety requirements, especially when they need technical change.

Enhancing public policies is crucial to empower small-scale farmers to overcome challenges and capitalize on the growing market demand for vegetables [8]. Crucially, these policies must consider not only the farmers' characteristics, but also their attitudes [9]. In this context, attitude is defined as an individual's evaluation of behavior and its consequences [10]. This evaluation is formed through the interaction of affective factors (feelings and emotions) and cognitive factors (thoughts and beliefs) [11]. Knowledge acquired through experience or education plays a vital role in shaping these attitudes. Therefore, by analyzing farmers' evaluations of food safety, alongside their characteristics and related knowledge, we can gain valuable insights. This approach enables the development of more targeted interventions, fosters greater self-awareness among farmers, and deepens the understanding that extensionists and consultants have of the farmers they serve [12].

This research investigates the following key questions: First, what are the characteristics of small-scale farmers, and how do they relate to farmers' compliance with food safety? Second, what are farmers' knowledge and attitudes towards food safety? Third, what distinct attitude profiles exist within this population?

2. Theoretical Framework

For this research, we adopt a theoretical framework centered on the concept of habitus, as developed by Pierre Bourdieu [13]. Habitus, in Bourdieu's terms, refers to the ingrained habits, skills, dispositions, and ways of thinking that individuals develop through their life experiences within a particular social context. It is a set of socially acquired perceptions that shape how people perceive the world and act within it.

This framework acknowledges that small-scale farmers operate within specific socio-economic and cultural contexts that shape their habitus. These contexts may include the predominance of small-scale farming, limited access to resources and formal markets, the influence of traditional farming practices, and the dynamics of local food systems. Farmers internalize specific practices and attitudes related to food safety through their daily experiences, interactions with other farmers, and exposure to information and regulations. This process leads to the development of a habitus that influences their perceptions of food safety risks, adoption of Good Agricultural Practices (GAP), engagement with formal certification processes, and relationships with market actors.

Building upon this, the habitus of small-scale farmers can illuminate how deeply ingrained routines and

shared understandings within their community influence their willingness and capacity to adopt new food safety practices, particularly when these practices deviate from established traditions or social norms. It helps explain why farmers might prioritize informal, trust-based relationships and experiential knowledge over formal certifications, even when aware of the latter's existence. Furthermore, considering habitus allows for an analysis of how external pressures, such as market demands for formal food safety standards, interact with and potentially challenge these deeply held dispositions, leading to dissonance or selective adoption of practices.

This framework indeed recognizes the potential for dissonance and misrecognition in farmers' understanding and practices related to food safety. Dissonance arises when farmers' internalized habitus clashes with the demands of external standards or market requirements. Misrecognition occurs when farmers do not fully recognize the value or necessity of complying with formal food safety standards, leading to a disconnect between their practices and the expectations of the broader food system.

It also considers the role of social capital and collective action in shaping farmers' practices. Social capital, defined as the networks of relationships and trust within a community, can influence farmers' access to information, resources, and support. Collective action, such as participation in farmer associations or cooperatives, can provide opportunities for knowledge sharing, capacity building, and negotiation with market actors [14–16].

By employing this habitus-informed framework, the study aims to provide a nuanced understanding of the complex interplay between socio-economic context, cultural practices, and individual agency in shaping food safety attitudes and practices among small-scale farmers. This understanding can inform the development of more effective and contextually relevant policies and interventions to enhance food safety in the region and promote the inclusion of small-scale farmers in formal market chains.

3. Materials and Methods

The data analyzed in this article were derived from a survey conducted within the Santiago Metropolitan Region (SMR). The SMR accounts for 42% of the population of Chile and generates 45% of the national Gross Domestic Product, 0.82% of which is agriculture [17]. It is divided into 52 districts, 34 of which form the biggest urban center in Chile, known as Gran Santiago. Despite its urban character, the SMR is the most important vegetable-producing region in Chile, encompassing 32.5% of the national cultivated area, which is concentrated in its southern area [18]. Small-scale farming is predominant in this production [19].

The sample comprised 80 small-scale vegetable growers, selected through convenience sampling. This non-probability sampling method is appropriate when randomization is challenging due to a large population size, and when the aim is to generate an exploratory analysis that does not claim absolute generalizability to the entire population to gain expeditious insights [20,21]. While random sampling is preferred to mitigate biases and enhance the validity of survey inferences, convenience sampling can still yield accurate results when the population exhibits homogeneity. Specifically, when participants share similar occupations and locations, the potential for generalizability is increased [22]. Furthermore, when the objective is descriptive, rather than causal inference, the reliability of a non-probabilistic sample drawn from a homogeneous population is considered robust [23].

The survey was structured into the following sections: i) farmers' characteristics and socio-demographic profile, ii) technical and production features, iii) access to technology and innovation, iv) farm management and commercialization, v) food safety-related knowledge, and vi) attitudes towards good agricultural practices and food safety. Responses for section (vi) were measured using a 5-level Likert scale, where 1 represented "completely disagree," 2 "disagree," 3 "indifferent," 4 "agree," and 5 "completely agree."

The survey data, encompassing all sections, were initially subjected to descriptive statistical analysis. Subsequently, multivariate analysis was employed to examine farmers' attitudes. Specifically, analysis of variance (ANOVA) was utilized to compare attitudes across identified clusters, yielding root mean square (RMS) values and F-ratios. Following cluster identification, a means

difference test was conducted to distinguish the characteristics of these clusters. All statistical analyses were performed using SPSS software.

4. Results

4.1. Descriptive Analysis of the Sample

Eighty farmers, comprising 52 males and 28 females with an average age of 52, participated in the survey. Their educational attainment varied substantially, with 7.5% having no formal education, 37.5% completing elementary school, 33.8% secondary school, 8.8% technical education, and 12.4% university.

Land ownership was common, with 48.7% owning their land and 38.8% renting. Drip (43.8%) and furrow (35%) irrigation were the most frequently employed methods. Most farmers (68.8%) cultivated their vegetables outdoors, while 31.1% used greenhouses. Conventional agricultural practices were dominant, with 82.1% of farmers utilizing them and only 17.9% engaging in organic farming. Agrochemical inputs were extensively used: fertilizers (82.6% of crops), herbicides (68.8%), and pesticides (54%). Biological inputs, such as guano and compost, were applied to approximately one-third of the crops.

The use of agrochemicals significantly impacts food safety, as evidenced by the dynamic regulation of maximum pesticide residue levels within sanitary and phytosanitary measures, which are subject to rapid technological advancements [24,25]. Therefore, a comprehensive examination of agrochemical practices was undertaken, with the results presented in **Table 1**.

Table 1. Farmers' practices for the use of agrochemical inputs.

Question	Options	%
Do you develop a pre-season plan for agrochemical application in your production?	Yes No N/A	61.2 32.5 6.3
Do you maintain a designated physical space for the measurement and preparation of agrochemicals?	Yes No N/A	61.2 32.5 6.3
Do you wear personal protective equipment when applying agrochemicals?	Yes No N/A	83.7 10 6.3
Are you aware of the recommended amounts of agrochemicals to use on your crops?	Yes No N/A	65 28.7 6.3
Are you aware of the expiration date when you use agrochemicals on your crops?	Yes No N/A	86.2 7.5 6.3
Do you follow the recommended withdrawal periods for your agrochemicals?	Yes No N/A	86.2 7.5 6.3
Do you utilize a specialized disposal method for used agrochemical containers?	Yes No N/A	76.2 15 8.8
Do you receive advice on the safe handling and application of agrochemicals?	Yes No N/A	66.2 27.5 6.3
Have you had any official inspections related to your agrochemical applications?	Yes No N/A	63.7 32.5 3.8

A strong majority of farmers reported understanding and applying plant disease management programs (76.25%), and similar levels of awareness (77.5%) and application (68.75%) were noted for fertilizer management. In stark contrast, knowledge and implementation of harvest and post-harvest management programs were considerably lower, at only 48.75% and 36.25%, respectively. Regarding basic food safety practices, a

significant proportion of farmers reported using gloves (72.5%) and disinfecting harvesting equipment (51.3%). However, adoption rates were considerably lower for post-harvest practices: only 23.75% disinfected vegetables before packaging, and 36.25% used new packaging for storage and sale. Similarly, production analysis showed limited uptake, with 26.3% performing microbiological analysis on their products and 51.3% analyzing irrigation water.

In addition, farmers were surveyed regarding their farm management and commercial practices, as these factors can be relevant to their motivation and capacity to comply with food safety requirements and adhere to certain certification schemes. Key findings include that over half (52.5%) are not registered with the Chilean tax service and are not legally recognized as companies. A similar proportion (47.5%) do not use bank accounts for their farm finances, and the majority (56.25%) do not belong to any farmers' associations; however, 78.75% share the information about food safety-related aspects, such as the use of agrochemicals, with other farmers. While most farmers (63.8%) have received support from the Ministry of Agriculture in the past five years, support from other public agencies like the Ministry of Economy or the Ministry of Social Development is limited (18.75%).

Respondents primarily commercialized their products through on-farm sales, wholesalers, middlemen, and open-air markets. Notably, a significant majority (76.25%) reported that their buyers did not explicitly require them to comply with any food safety standards. Indeed, when questioned about having Ministry of Health recognition for food production, only 18.8% of farmers indicated they did, and even fewer (7.5%) possessed HACCP certification. Despite this, a substantial 65% claimed to follow Good Agricultural Practices, but without formal certification. However, a clear gap in understanding exists, as while a large majority (86.25%) reported that they know what GAP means, significantly fewer (46.25%) claimed to know the meaning of food safety. This is underscored by the fact that 60% of farmers incorrectly believe GAP and food safety are synonymous.

4.2. Assessment of Statements Referred to Attitudes

The results of the assessment of statements in the survey referring to attitudes are in **Table 2**. Farmers largely believed their production systems guaranteed food safety. The statement "My productive system ensures a safe product" received the highest value (average score: 4.65). Strong agreement was also evident for "The time I work in my farm is enough to ensure a safe production" and "I implement Good Agricultural Practices in my farm" (4.46 and 4.40, respectively). This is complemented by a strong belief that change has been necessary to improve food safety in their products, as evidenced by the low score (2.95) for the statement, "Traditional production techniques were enough to ensure safe products."

Table 2. Farmers' attitudes towards food safety-related issues statements.

Statement	Mean
My productive system ensures a safe product	4.65
The seed propagation techniques that I use are adequate	4.36
The weed control techniques that I use are adequate	4.29
The pest and disease control techniques I use are adequate	4.38
The agrochemical residues management techniques that I use are adequate	3.78
The use of agrochemicals on my farm should be in the hands of a specialist	4.25
My record control is adequate in all production areas	3.65
The irrigation techniques that I use are adequate	4.39
I have adequate equipment to preserve my products	3.59
My infrastructure allows for the orderly disposal of products and inputs	4.10
The time I work in my farm is enough to ensure a safe production	4.46
Middlemen are relevant for the commercialization of my products	3.43
Being registered with the tax service is relevant to selling my products	3.61
I implement Good Agricultural Practices in my farm	4.40
GAP implementation entails a high investment	3.94
I do not have adequate knowledge and assistance to implement GAP	3.10
I do not obtain any benefit from implementing GAP	3.36
I do not have enough time to implement GAP	3.13
Implementing GAP is complicated	3.36
Traditional production techniques were enough to ensure safe products	2.95

Respondents generally reported satisfaction with their pest, disease, and weed control, as well as their irrigation techniques and infrastructure for product and input disposal. However, they expressed less confidence in their agrochemical residue management, record-keeping, and product preservation practices, assigning lower scores to these areas. Regarding commercialization, farmers appeared reluctant to embrace formal economic incorporation to improve sales, and they also questioned the relevance of middlemen.

Farmers' confidence in their ability to implement GAP, regarding both time and skills, was evident in the low scores assigned to the statements "I do not have adequate knowledge and assistance to implement GAP" (3.10), "I do not have enough time to implement GAP" (3.13) and "Implementing GAP is complicated" (3.36). Farmers expressed concern about the economic investment required for GAP implementation (score: 3.94 for "GAP implementation entails high investment"). This concern was contrasted by their apparent belief in potential returns, as indicated by the lower score (3.36) for the statement "I do not obtain any benefit from implementing GAP."

4.3. Cluster Analysis of Farmers in Terms of Their Attitudes

ANOVA analysis was applicable to ten out of the twenty attitude statements assessed. This analysis identified significant differences for six statements. Results are presented in **Table 3**. Two groups of farmers with distinct attitudes were detected. Group 1 (n = 47) gave higher scores to the statements on formal economy and commercialization intermediaries, record-keeping, and GAP implementation compared to Group 2 (n = 33). However, no significant differences in attitudes were found between the groups regarding statements on production techniques and infrastructure.

Table 3. Variance analysis (ANOVA) of the difference among centers in each cluster.

Statements	Cluster RMS	Error RMS	F (sig)
The pest and disease control techniques I use are adequate	0.291	0.519	0.561 (0.456)
The agrochemical residues management techniques that I use are adequate	26.287	1.996	13.172 (0.001)
My record control is adequate in all production areas	9.331	1.678	5.561 (0.021)
The irrigation techniques that I use are adequate	0.740	0.772	0.958 (0.331)
I have adequate equipment to preserve my products	2.104	1.888	1.115 (0.294)
My infrastructure allows for the orderly disposal of products and inputs	0.954	1.003	0.951 (0.333)
Being registered with the tax service is relevant to selling my products	47.082	1.896	24.829 (0.000)
Middlemen are relevant for the commercialization of my products	95.482	1.437	66.456 (0.000)
GAP implementation entails a high investment	43.192	1.250	34.555 (0.000)
Implementing GAP is complicated	46.306	1.720	26.918 (0.000)

The identified clusters showed no significant differences in member characteristics such as age, gender, educational level, production practices, or standards implementation. However, a few variables did differentiate the groups. Organic production, for instance, was exclusively present in Group 2, which also exhibited a higher rate of self-consumption. Additionally, the responses of Group 2 farmers indicated a significantly higher use of records, equipment disinfection practices, and post-harvest equipment for vegetable preservation.

5. Discussion

Surveyed farmers presented a notable demographic profile: a high average age and generally limited formal education. The mean age observed is consistent with findings from prior studies on farmers in central Chile, which documented average ages between 50 and 55 years [16,26]. This aging phenomenon is largely driven by the ongoing migration of young people from rural to urban areas, a trend expected to persist. This migration is reflected in Chile's declining rural population, which decreased from 13.4% in 2002 to 12.2% in 2017, with projections indicating a further reduction to 10.9% by 2035 [27,28]. The educational level of the farmers surveyed is considerably below the national average for adults over 18, as reported in the CASEN 2022 survey [29]; however, it is more representative of the educational attainment typically observed within older populations. When designing interventions,

these characteristics require careful consideration. Notably, individuals with lower educational attainment may encounter difficulties in comprehending certain training materials and methodologies, while older farmers may exhibit reduced willingness to innovate in their production methods [30]. In terms of food safety, it's relevant to acknowledge that experienced farmers may operate under their own, potentially non-compliant, practices. Research suggests these differences make compliance challenging for small-scale farmers and hinder their market participation [31].

The gender distribution observed in the sample is consistent with national statistics, as the 2022 Agricultural Census reports that only 31.5% of Chilean farms operated by natural persons are managed by women [32]. The result suggests a potential underrepresentation of the challenges faced by female farmers in Chilean small-scale agriculture, such as restricted access to resources and commercialization channels, and the combined responsibilities of farm labor and care work [33,34]. Prior research in Central Chile has shown that small-scale female farmers dedicate a significant portion of their production to self-consumption [35]. This practice is relevant to food safety, as studies in developing countries suggest a positive correlation between self-consumption and the adoption of safety practices [36].

Literature indicates that horizontal integration in agricultural chains — through cooperatives or other associations — enhances farmers' access to financial services, technology, and market information, thereby improving their returns [15]. Specifically, horizontal farmer associations can promote food safety practices by providing technical assistance, monitoring, and leveraging social incentives [14,16]. Similarly, multi-stakeholder associations involving government and other value chain actors can also strengthen food safety practices [37]. However, farmers' participation and commitment to associations are often limited by their attitudes and perceptions, which are influenced by factors such as farm size and market integration [38]. In our sample, while most farmers do not belong to associations, they frequently share food safety knowledge with peers. This aligns with research on small-scale fruit and vegetable growers in central Chile, which revealed a high level of trust in both peers and public institutions regarding food safety [39]. Notably, most surveyed farmers are beneficiaries of the Ministry of Agriculture programs.

Surveyed farmers primarily market their produce through local channels, including on-farm sales and open-air markets, with a significant presence of wholesalers and middlemen. This reliance on informal channels is coherent with their limited participation in the formal economy. Research on small-scale fruit growers in central Chile indicates that access to formal markets incentivizes adherence to food safety practices [40]. Notably, most surveyed farmers reported participating in markets that do not require compliance with food safety standards. This is likely to negatively impact their adoption of food safety regulations and certifications.

Our findings indicate that farmers exhibit strong confidence in their food safety knowledge, particularly concerning GAP. This aligns with prior research suggesting that food safety knowledge levels may be comparable across farms of varying sizes. However, small-scale farmers often face significant barriers to formal compliance, primarily stemming from the design of standards, including complex metrics and certification processes [41]. Consistent with this, Chen et al. [42,43] demonstrated that small-scale farmers may perceive food safety regulations as impediments to value addition, despite acknowledging their knowledge. Time constraints and information overload further hinder their ability to deepen their understanding of food safety. This observation resonates with our results, as farmers in our sample appear to rely heavily on experiential learning. Furthermore, Chen et al. [42,43] found that farmers recognize the importance of food safety for their production. We observed a similar awareness within our sample, particularly regarding attitudes towards GAP. In the Chilean context, studies on small-scale fruit growers have shown that GAP implementation positively impacts revenue [37,44]. However, our sample reveals a divergence: farmers adhere to their perceived understanding of GAP, which may not align with official standards. This lack of formal certification is a critical obstacle to accessing improved market opportunities and realizing potential economic gains.

When faced with barriers to accessing formal standards, even when implementing sound practices, small-

scale farmers often seek alternative solutions. Research indicates that collective action, built on trust and credibility, can serve as a substitute for external compliance [45]. In Chile, studies have highlighted how small-scale female farmers prioritize trust-based relationships with buyers, particularly restaurants. These arrangements allow buyers to directly verify food quality and safety through farm visits [32]. However, this approach is constrained by the intensive engagement and proximity required from buyers, limiting its scalability. To overcome these obstacles, Chile has recently developed specific solutions, including the *Manos Campesinas* (Peasant Hands) certification, managed by Ministry of Agriculture extension agents, and Participatory Guarantee Systems (involving farmers' associations) for organic agriculture.

Furthermore, institutional context significantly influences market access for local farmers. Research indicates that weak national food safety control systems hinder small-scale farmers' ability to penetrate international markets due to difficulties in complying with stringent standards [46]. Conversely, Chile's robust technical regulations, as evidenced by De María et al. [47], prepare farmers for international market demands. Moreover, Chile's extensive network of over 30 Free Trade Agreements, many featuring sanitary and phytosanitary measures, fosters communication and coordination among trading partners. This regulatory harmonization mitigates potential trade barriers imposed by technical regulations [48–50]. Consequently, Chilean farmers benefit from a favorable international economic relations context regarding food safety compliance. However, it is important to note that these advantages are likely more pronounced and readily capitalized upon by established exporters.

The cluster analysis identified two farmer groups with divergent attitudes regarding integration into the formal economy, commercialization intermediaries, record-keeping, and GAP implementation. Specifically, commercially oriented farmers engaged in conventional agriculture demonstrated a heightened awareness of the difficulties associated with GAP implementation compared to the cluster with the presence of farmers focused on self-consumption and organic farming. This suggests that on-farm practical experience, especially in limited market access scenarios, plays a crucial role in shaping small-scale farmers' perceptions of food safety, generating even misunderstandings about its scope. Furthermore, participation in market dynamics appears to be a key driver in farmers' understanding of formal food safety regulations and the associated compliance challenges.

6. Conclusions

Surveyed small-scale farmers are characterized by advanced age, limited formal education, and a predominantly male demographic. These factors potentially influence their current production practices, including food safety, and their willingness to adopt innovations. The farmers' reliance on informal commercial channels, which typically lack explicit food safety requirements, likely discourages compliance. Given their limited participation in the formal economy, transitioning to markets demanding food safety standards presents a significant challenge. While association membership holds potential for enhancing food safety practices, such as through technical assistance, monitoring, or social incentives, surveyed farmers exhibit low participation rates. Nonetheless, widespread information exchange among farmers and engagement with government programs, especially those from the Ministry of Agriculture, indicate that food safety initiatives leveraging peer-to-peer and government-to-farmer mechanisms could yield significant benefits.

Farmers express high confidence in their food safety knowledge, particularly regarding GAP. However, findings indicate that their understanding, primarily derived from on-farm experience, may diverge from official standards. Notably, market-oriented farmers demonstrate a more accurate comprehension of these standards and the associated compliance challenges, which are often underestimated by those with limited market access. The absence of certification significantly impedes farmers' access to enhanced market opportunities and potential economic benefits, which can be overlooked due to their reliance on buyers who do not prioritize certification. Nevertheless, despite these limitations, farmers recognize the importance of food safety.

However, their understanding of its scope may be limited, as many conflate GAP with food safety.

The cluster analysis revealed the existence of two distinct farmer groups delineated by their attitudes towards food safety, market orientation, and perceived benefits of integration into the formal economy. While these groups did not significantly differ in basic demographic characteristics or production techniques, commercially oriented farmers engaged in conventional agriculture demonstrated a heightened awareness of the difficulties associated with GAP implementation compared to the cluster with a presence of farmers focused on self-consumption and organic farming. This suggests that direct engagement with market dynamics is a crucial driver in shaping farmers' understanding of formal food safety regulations and the associated compliance challenges. Conversely, those with limited market access or focused on self-consumption often underestimate these challenges, confirming how on-farm practical experience in diverse market scenarios plays a critical role in shaping perceptions and even leads to misunderstandings about the scope of food safety.

These results underscore the urgent need for targeted public policies designed to bridge the gap between farmers' current practices and the requirements of formal food safety standards. These policies should address technical resource gaps, clarify conceptual ambiguities, and implement a gradual, participatory strategy involving peer learning and the development of market opportunities that explicitly value food safety compliance. Chile has certain advantages, such as a good level of its food control system and the collaborative networks with the competent authorities of its main markets. Also, the country has experience in participatory certification schemes. These schemes can foster trust and credibility within local food systems, potentially serving as a stepping stone towards formal compliance for those with limited market access. Overall, to address compliance gaps, it is relevant as well to translate complex technical regulations into accessible formats for small-scale farmers.

To facilitate greater food safety compliance and economic advancement, it is crucial as well to promote formal market integration and strengthen farmer associations. Implementing programs that incentivize small-scale farmers to register with the tax service and formally recognize their operations is a fundamental initial step towards their integration into the formal economy. Concurrently, encouraging and supporting farmers' participation in associations and cooperatives is vital, as these collective structures significantly enhance their access to financial services, technology, market information, and technical assistance. Furthermore, these associations play a key role in promoting food safety practices through both monitoring and social incentives, thereby bolstering overall adherence to standards.

Furthermore, specific attention must be paid to improving inclusivity, particularly for female farmers. Given their underrepresentation and unique challenges, policies should aim to tailor extension services, facilitate access to resources, and promote leadership roles within agricultural associations for women. Supporting female farmer networks and valuing their existing practices, such as self-consumption and trust-based relationships with buyers, can serve as stepping stones towards broader food safety adoption and formal market integration.

Finally, it is relevant to acknowledge certain limitations in this research, particularly concerning the sampling methodology and potential reporting biases, which may affect the generalizability and interpretation of the findings. Firstly, the use of convenience sampling, while practical for exploratory analysis, introduces limitations. Although the sample is drawn from a relatively homogeneous population in terms of occupation and location, this non-probability sampling method means that the findings may not be generalizable to the entire population of small-scale farmers in the SMR or other regions of Chile. Future research employing random sampling techniques would enhance the external validity of the results and allow for broader inferences. Secondly, the study relies on self-reported data from farmers, particularly concerning their adherence to GAP, their understanding of food safety, and their various farming practices. This suggests a potential reporting bias, where farmers' perceptions of their practices and knowledge may not always align with objective standards or formal definitions. Such discrepancies could stem from a desire to present themselves favorably or from genuine mis-

understandings, potentially overestimating their compliance or knowledge levels. Future studies could benefit from incorporating objective verification methods, such as direct observation of practices or validation against formal records, to complement self-reported data and mitigate this bias.

Author Contributions

Conceptualization, S.B. and G.L.; methodology, S.B. and G.L.; software, G.L.; formal analysis, G.L.; supervision, S.B.; writing—original draft preparation, S.B. and G.L.; writing—review and editing, S.B. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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