Original Research

Mental wellbeing of Norwegian farmers: what are the main facilitators and barriers? An exploratory study

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Abstract

Introduction: Farmers are among the occupational groups with the highest risk of mental illness. This exploratory study aimed to investigate how Norwegian farmers perceive different facilitators of and barriers to mental wellbeing in their everyday lives, and the possible relationships between these factors and overall mental wellbeing.
Methods: This study included 265 Norwegian farmers (142 males and 123 females) who responded to an online survey. The five-item WHO Well-Being Index was employed to evaluate farmers' mental wellbeing.

Results: The results showed that 34.7% of the respondents reported wellbeing scores that indicated they should be further screened for major depression. Female farmers reported significantly lower mental wellbeing scores than male farmers. Furthermore, full-time farmers had lower wellbeing scores than part-time farmers. The factors that most respondents perceived to be barriers to wellbeing in everyday life were unstable economics and a lack of appreciation for their work. The primary facilitators were stable and secure economics and a good social network within and outside of agriculture.

Conclusion: Analysis suggests that perceived barriers seem to have a higher importance for farmers' wellbeing than the perception of facilitators. Future studies should further investigate the effects of individual barriers on mental wellbeing.

Keywords

farmer, mental health, mental wellbeing, occupational health online survey, Norway.

Introduction

Multiple international studies have shown that farmers are among the occupational groups with the lowest mental health scores[1-3]. Most research in this field thus far has been conducted in North America, Australia, India, and Europe (specifically in the UK and Norway[4]). In Norway, Sanne and colleagues reported 20 years ago that farmers were the occupational group with the highest risk of anxiety and depression[5]. More recent findings from the HUNT study[6,7] suggest that farmers are exposed to unfavorable working conditions, such as long working hours and high physical demands, and that farmers may be more reluctant to seek help regarding their mental health than other occupational groups. A recent study by Logstein and colleagues found that approximately 18% of farmers reported having considered seeking professional help for mental health issues during the previous year, and 30% knew other farmers who struggled with their mental health[8]. Compared with international studies that have reported between 34% and 57% of farmers being at risk for depression and other mental disorders[2], Norwegian farmers appear to be doing better from a mental health standpoint than their peers from many other countries. Researchers have thus sought to identify the factors influencing mental health and mental wellbeing[1,3,7,9] and suicide[2] risk in this population. In their recent literature review, Younker and Radunovich identified six key drivers of mental health among farmers: physical health, financial wellbeing, social support, coping skills, assistance and referral during crisis, and culturally appropriate and available care[3]. Torske and colleagues reported that rapid changes leave farmers with an elevated perception of a lack of control[6]. These developments include, among others climate change, a demographic crisis and farmers unable to find successors for their farms[6,10]; more recently the COVID-19 pandemic[3], the energy price crisis and the supply chain cut-offs caused by the war in Ukraine have placed additional pressure on farmers[11]. In a Canadian study by Bondy and Cole, ecological farmers reported that farmers need to be more 'adaptable, flexible, inventive, creative and ready to deal with change'[12]. Farmers should thus be considered a vulnerable group and at the same time a key factor in every society's ability to maintain a sufficient and sustainable food supply[8].

From a public health perspective, it is of interest to further evaluate farmers' perspectives regarding which of the abovementioned factors impact them most, both positively and negatively. A recent mixed-methods study in Canada showed through both statistical analysis of questionnaire data and semi-structured interviews that financial stressors are a major uncertainty for farmers as well as dissatisfaction with support from family, peers and the industry[13]. Such knowledge is critical to efforts to design and implement effective health promotion interventions[14]. In addition, previous studies in Norway have often been limited to specific regions and thus do not provide an overview of the state of mental wellbeing among farmers across Norway[6,15]. The Norwegian government has outlined four principal goals for Norwegian agriculture: food security, maintenance of farming activities throughout the country, increased value creation, and sustainable agriculture[16]. An enhanced understanding of the wellbeing of farmers is therefore important for policymakers, particularly in achieving the goals of sustainable agriculture and food security[7].

This exploratory study aimed to investigate which facilitators and barriers farmers perceive important (if at all) in their everyday lives regarding their mental wellbeing. Mental wellbeing is here seen as an integrated dimension of mental health[17]. The objective was to answer the following questions: What is the status of mental wellbeing among Norwegian farmers? Is there a connection between farmers' mental wellbeing and their perceived facilitators and barriers in everyday life? Which perceived facilitators and barriers are most important to farmers regarding mental wellbeing?

In order to investigate these questions, a digital survey study was conducted among Norwegian farmers.

Methods

Population and recruitment

The target population comprised Norwegian farmers involved in all types of agricultural production. In Norway this population comprises 37,561 people[18]. Participants were recruited through the regional social media accounts for agriculture and local leaders of the Norwegian Farmers' Union (*Norges Bondelag*), which forwarded the information to their 60,482 union members[19]. Recruitment material included information regarding the study and a link to the survey. Data collection took place in February and March 2023. The inclusion criteria for participation were being an active farmer aged 18 years or older, giving informed consent to participate in the study, and completing the entire questionnaire.

Measurements

The survey application tool *Nettskjema* (University of Oslo; https://nettskjema.no/?lang=en) was utilized for data collection. In addition to demographic background data, information regarding age, gender, residence, and the details of participants' agricultural work were collected. The farmers' mental wellbeing was measured using the Norwegian version of the five-item World Health Organization (WHO-5) Well-Being Index[20]. Facilitators and barriers in everyday life were determined based on an analysis of the literature and the results of an earlier qualitative study[21], which interviewed 13 persons in agriculture (eight farmers and five agricultural advisors) regarding facilitators of and barriers to mental health. The factors were supplemented by facilitators and barriers found in a review of the literature. The importance of individual factors was measured using a four-point Likert scale ranging from 1 ('not important/does not affect me') to 4 ('very important/affects me greatly'). Both scales were tested for their internal consistency and demonstrated satisfactory Cronbach's alpha values of 0.80 (facilitators) and 0.88 (barriers).

Statistics

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) v28 (IBM Corp; https://www.ibm.com/products/spss-statistics). For the WHO-5 Well-Being Index, a score for each participant ranging from 0 to 25 points was calculated. A cut-off at 13 points was utilized, below which individuals were advised to undergo further diagnostics for depression[22]. Sum scores were calculated for facilitators and barriers, with scores ranging from 12 to 48 for facilitators and 11 to 44 for barriers. Summing was deemed appropriate, since the the scales for these categories showed internal consistency, as described earlier. All sum scores were not normally distributed in the sample, according to the Kolmogrov–Smirov test ($p<0.01$). Differences between groups (gender, age, full-time or part-time work) were calculated using the independent t-test and analysis of variance. Correlation was calculated by bivariate Pearson correlation analysis. Correlation values of 0.1–0.29 were deemed small, values of 0.3–0.49 as medium and values of 0.5–1.0 as large[23]. Effect size to evaluate clinical difference between groups was calculated using Cohen's d. Multiple regression analysis was performed to determine the influence of perceived facilitators and barriers regarding mental wellbeing.

Ethics approval

The study was approved by the Norwegian Agency for Research Data (SIKT; reference number: 517200).

Results

Demographics

A total of 368 people responded to the digital survey. Of these respondents, 76 were excluded for not being active farmers: 10 were retired farmers, 46 were supposed to take over a farm but weren't working on the farm yet and 20 were agricultural advisors but not working as farmers themselves. Another 27 respondents were excluded because they did not complete the entire questionnaire. The remaining 265 participants were included in the analysis (142 males and 123 females). The majority of the sample were full-time farmers (167; 63%), with the remaining respondents being part-time farmers (98; 37%). Originally, the sample consisted of six age groups: 18–29 years (53; 20%), 30–39 years (65; 24.5%), 40–49 years (89; 33.6%), and 50-59 years (48; 18.4%) and 60 years and older (10; 3.5%). To ensure group sizes that could be used for further analysis, respondents aged over 60 years were included in the 50 years and older group. Most farmers either solely farmed livestock and animal-related products (146; 55.1%) or had a combined production of animals, crops, fruit, vegetables, and/or forestry (50; 40.7%). Only 4.2% (11) of the respondents produced solely crops, fruit, and/or vegetables.

Mental wellbeing

Table 1 provides an overview of the sample's mental wellbeing, facilitators, and barriers. The mean wellbeing score was 13.56 (standard deviation ±5.0). The mean female score (12.8±4.7) was significantly lower ($p<0.05$) than the mean male score (14.2±5.2), although a statistical difference analysis for effect size revealed that the differences were not on a clinical level ($\eta^2=0.02$). Wellbeing scores below the cut-off (13), where further diagnostic screening for major depression is indicated, were found in 34.7% (92) of the sample (50; 40.7% of females and 42; 29.5% of males). Full-time farmers had a lower mean score than part-time farmers (13.2±5.4 v 14.2±4.3), although the difference was not statistically significant ($p=0.07$). Regarding age, the group of farmers over the age of 50 years had the highest mean wellbeing score (15.0±5.5), followed by the group aged 18–29 years (13.9±4.3), the group aged 30–39 years (13.0±4.9), and the group aged 40–49 years, which had the lowest mean score (12.9±5.0). There were no significant differences between the age groups.

Table 1: Study scores for Norwegian farmers' mental wellbeing, perceived facilitators and perceived barriers

Mental wellbeing/factor type	Score (mean±SD)								
	Sample (*n*=265)	Gender		Age (years)				Work	
		Male (*n*=142)	Female (*n*=123)	18–29 (*n*=53)	30–39 (*n*=65)	40–49 (*n*=89)	≥50 (*n*=58)	Full-time (*n*=167)	Part-time (*n*=98)
Mental wellbeing (range 0–25)	13.56±5.0	14.2±5.2	12.8±4.7†	13.9±4.3	13.0±4.9	12.9±5.0	15.0±5.5	13.2±5.4	14.2±4.3
Facilitator (range 12–48)	37.5±4.9	36.8±5.2	38.4±4.4†	37.5±4.9	38.3±5.3	37.0±4.4	37.5±5.1	37.9±4.7	36.9±5.2¶
Barrier (range 11–44)	29.1±29.1	28.5±7.2	29.9±6.6†	29±6.9	29.6±7.6	30.2±5.9	27.1±7.5	29.7±7.2	28.2±6.5¶

† Significant difference for male farmers.
¶ Significant difference for full-time farmers.
SD, standard deviation.

Facilitators and barriers

Tables 2 and 3 present the scores for individual perceived facilitators and barriers, respectively, for the sample and the subgroups. The most important facilitators, as perceived by the farmers, were secure and stable economics (3.63±0.53), good mental health (3.55±0.6), and receiving appreciation for their work (3.39±0.7). Physical activity outside of work (2.4±0.9) and vacation away from the farm (2.67±1.0) had the lowest mean scores. Female farmers valued secure and stable economics ($p<0.05$) and receiving appreciation for their work ($p<0.01$) significantly more than male farmers. Compared to part-time farmers, full-time farmers perceived secure economics ($p<0.05$) and vacations away from the farm ($p<0.05$) to be significantly more facilitating. The age group of 18–29 years valued a social network within and outside of agriculture significantly more than farmers aged 40–49 years ($p<0.05$). No other significant differences in facilitator scores were found between subgroups.

Regarding barriers, an unstable economy (3.21±1.0), poor mental health (2.97±1.0), and a lack of appreciation for their work (2.95±0.9) affected farmers the most, while a lack of knowledge about their work (2.22±0.9) and a lack of control over their workday (2.33±0.9) were least relevant. Female farmers perceived a lack of appreciation for their work as a significantly more important barrier than their male counterparts ($p<0.01$). Full-time farmers perceived a lack of a network outside of agriculture ($p<0.05$), a lack of appreciation ($p<0.05$), a lack of vacation away

from the farm ($p<0.05$), and too little leisure time ($p<0.05$) as significantly more influential barriers than part-time farmers. Between age groups, farmers aged 40–49 years perceived an unstable economy ($p<0.01$) and too little vacation time away from the farm ($p<0.05$) to be significantly more important barriers than farmers over the age of 50 years. In addition, a significant difference in perception of too little vacation time away from the farm was found between farmers aged 18–29 years and 40–49 years, with the older group perceiving this factor as more of a barrier ($p<0.01$).

Regarding the sum scores for facilitators and barriers (Table 1), females had significantly higher scores than males for both facilitators and barriers ($p<0.01$). Full-time farmers had significantly higher facilitator scores than part-time farmers ($p<0.05$), while part-time farmers had significantly higher barrier scores than full-time farmers ($p<0.05$). No significant differences in sum scores were found between age groups.

Table 2: Facilitator scores for Norwegian farmers to thrive in everyday life[†]

Facilitating factor to thrive in everyday life[†]	Score (mean±SD)								
	Sample (n=265)	Gender		Age (years)				Work	
		Male (n=142)	Female (n=123)	18–29 (n=53)	30–39 (n=65)	40–49 (n=89)	≥50 (n=58)	Full-time (n=166)	Part-time (n=98)
Secure and stable economy	3.63±0.50	3.55±0.56	3.72±0.47[¶]	3.68±0.51	3.68±0.47	3.63±0.51	3.52±0.63	3.68±0.51	3.54±0.56[‡]
Social network within agriculture	2.95±0.80	2.9±0.76	3.02±0.75	3.21±0.72	2.97±0.87	2.82±0.68	2.91±0.78	2.96±0.81	2.95±0.69
Social network outside of agriculture	2.93±0.70	2.85±0.76	3.02±0.74	3.09±0.69	2.95±0.82	2.73±0.69[§]	3.05±0.78	2.94±0.76	2.91±0.75
Receiving appreciation for my work	3.39±0.70	3.25±0.72	3.54±0.56[¶]	3.45±0.61	3.38±0.68	3.37±0.68	3.36±0.69	3.43±0.65	3.33±0.69
Having enough knowledge to do my job	3.34±0.60	3.27±0.59	3.42±0.54	3.43±0.61	2.29±0.58	3.31±0.51	3.34±0.64	3.37±0.57	3.3±0.60
Vacation away from the farm	2.67±1.00	2.65±0.98	2.69±0.92	2.38±0.86	2.78±0.98	2.78±1.02	2.66±0.85	2.75±0.96	2.54±0.93[‡]
Leisure time	2.84±0.90	2.73±0.88	2.97±0.83	2.66±0.88	3.02±0.94	2.85±0.86	2.79±0.74	2.9±0.86	2.73±0.87
Physical activity outside of work	2.4±0.90	2.32±0.96	2.48±0.83	2.17±0.78	2.51±1.00	2.35±0.92	2.55±0.86	2.33±0.90	2.49±0.91
Good physical health	3.29±0.70	3.24±0.65	3.35±0.64	3.25±0.76	3.3±0.65	3.28±0.58	3.28±0.64	3.32±0.62	3.23±0.69
Good mental health	3.55±0.60	3.54±0.65	3.58±0.57	3.58±0.66	3.63±0.55	3.52±0.54	3.5±0.66	3.58±0.58	3.51±0.61
Control over my own work day	3.31±0.60	3.3±0.58	3.33±0.60	3.32±0.58	3.42±0.50	3.21±0.59	3.34±0.66	3.38±0.55	3.2±0.72
Time with family and friends	3.22±0.70	3.18±0.74	3.26±0.71	3.25±0.81	3.34±0.69	3.15±0.73	3.16±0.67	3.27±0.72	3.13±0.73

[†] Values for individual facilitators ranged from 1 ('not important'/'does not affect me') to 4 ('very important'/'affects me greatly').
[¶] Significant difference for male farmers.
[§] Significant difference for farmers aged 18–29 years.
[‡] Significant difference for full-time farmers.
SD, standard deviation.

Table 3: Barrier scores for Norwegian farmers to thrive in everyday life[†]

Barrier factor with negative effect in everyday life	Score (mean±SD)								
	Sample (n=265)	Gender		Age (years)				Work	
		Male (n=142)	Female (n=123)	18–29 (n=53)	30–39 (n=65)	40–49 (n=89)	≥50 (n=58)	Full-time (n=166)	Part-time (n=98)
Unstable economy	3.21±1.00	3.17±0.98	3.25±0.91	3.23±0.95	3.28±0.86	3.42±0.80	2.79 ±1.10[§]	3.24±0.97	3.15±0.90
Lack of social network within agriculture	2.31±0.90	2.27±0.88	2.35±0.91	2.51±0.89	2.28±0.91	2.27±0.84	2.22±0.96	2.34±0.89	2.27±0.90
Lack of social network outside of agriculture	2.48±1.00	2.44±0.99	2.54±0.91	2.6±0.99	2.46±0.99	2.53±0.89	2.33±0.96	2.56±0.92	2.36±0.99[¶¶]
Lack of others' appreciation for my work	2.95±0.90	2.8±0.90	3.13±0.85[¶]	2.81±0.86	2.91±1.00	3.13±0.76	2.84±0.97	3.02±0.93	2.83±0.83[¶¶]
Lack of knowledge needed for my job	2.22±0.90	2.18±0.89	2.27±0.91	2.42±0.93	2.26±0.96	2.18±0.91	2.05±0.76	2.22±0.90	2.21±0.90
Too little vacation away from the farm	2.51±1.00	2.49±1.00	2.53±1.00	2.21±0.97	2.65±1.10	2.74±0.96[‡]	2.28±0.89[§]	2.61±1.02	2.34±0.96[¶¶]
Too little leisure time	2.7±1.00	2.61±0.97	2.8±0.91	2.55±0.89	2.75±1.08	2.89±0.89	2.48±0.88	2.78±0.98	2.56±0.89[¶¶]
Bad physical health	2.69±1.00	2.63±1.00	2.76±1.00	2.68±1.03	2.62±0.96	2.76±0.99	2.69±1.05	2.71±1.06	2.65±0.95
Bad mental health	2.97±1.00	2.89±0.98	3.07±0.99	3±0.96	3.08±0.96	3.09±0.91	2.66±1.12	3.03±1.02	2.88±0.92
Lack of control over my work day	2.33±0.90	2.25±0.92	2.41±0.97	2.26±1.08	2.35±0.94	2.39±0.89	2.26±0.91	2.36±0.97	2.28±0.91
Too little time with family and friends	2.77±0.9	2.74±0.85	2.8±0.94	2.74±0.92	2.94±0.91	2.81±0.88	2.53±0.82	2.81±0.94	2.7±0.89

[†] Values for individual facilitators ranged from 1 ('not important'/'does not affect me') to 4 ('very important'/'affects me greatly').
[¶] Significant difference for male farmers.
[§] Significant difference for farmers aged 40–49 years.
[‡] Significant difference for farmers aged 18–29 years.
[¶¶] Significant difference for full-time farmers.
SD, standard deviation.

Importance of facilitators of and barriers to mental wellbeing

Correlation analysis between the sum scores for facilitators and barriers and the sum score for mental wellbeing showed a small relationship between facilitators and mental wellbeing (0.13; $p<0.05$) and a medium negative relationship between barriers and mental wellbeing (-0.35; $p<0.01$) (Table 4). According to Field, only the correlation between mental wellbeing sum scores and perceived barrier sum scores reached a medium to large level[24]. Regression analysis revealed R^2 values of 0.09 for facilitators and -0.29 for barriers. Among the subgroups, only a few subgroups demonstrated significant correlations between wellbeing scores and facilitator sum scores, all of which were small- to medium-level correlations. By contrast, all subgroups except for the range of 18–29 years and part-time farmers showed medium to large significant negative correlations between wellbeing scores and barrier sum scores ($p<0.01$). The highest correlations occurred in the subgroups of full-time farmers ($r= -0.42$) and farmers over the age of 50 years ($r= -0.41$), indicating that these groups' wellbeing may be most negatively affected by perceived barriers. Regression analysis of individual facilitators and barriers showed that the facilitator of a good social network within agriculture, and the barriers of unstable economics, too little leisure time, and bad physical health, had a significant influence on mental wellbeing scores.

Table 4: Correlations between WHO-5 Well-Being Index raw score and sum scores for facilitators and barriers

Factor type	Correlation with raw score WHO-5 Well-Being Index[20] (r, p-value)								
	Sample	Gender		Age (years)				Work	
		Male	Female	18–29	30–39	40–49	≥50	Full-time	Part-time
	(n=265)	(n=142)	(n=123	(n=53)	(n=65)	(n=89)	(n=58)	(n=166)	(n=98)
Facilitator	0.13, <0.05*	–0.18, <0.05*	0, 0.99	0.04, 0.76	–0.26, <0.05*	–0.25, <0.05*	0.47, 0.73	–0.16, <0.05*	–0.05, 0.66
Barrier	–0.35, <0.01**	–0.34, <0.01**	0.35, <0.01**	–0.09, 0.52	–0.38, <0.01**	–0.37, <0.01**	–0.41, <0.01**	–0.42, <0.01**	–0.16, 0.11

*p<0.05, **p<0.01, ***p<0.001.

Discussion

This study aimed to investigate how important farmers perceive different factors as either facilitators of or barriers to their mental wellbeing in everyday life. Several previous studies have investigated farmers' mental health in general[1,3,6,9,15,25].

Main findings

Similar to the results of these studies, farmers in the present study demonstrated low mental wellbeing levels, with 34.7% (92) of the sample scoring below the WHO-5 Well-Being Index cut-off, under which further screening for major depression is recommended. In a previous study in Norway, Sanne and colleagues[15] reported that 24% of animal producers were at risk of depression[15]. The majority of the sample in the present study were similarly employed in either solely livestock production or a combination of animal and other production. Although Sanne and colleagues used different instruments to measure outcomes[15], a possible increase of 10% of the farming population who are at risk for depression or mental illness is concerning. The difference between results is in line with a study by Steen and colleagues, who reported an increase in anxiety and depression symptoms between HUNT study 3 (2006–2008) and HUNT study 4 (2017–2019)[7]. Regarding differences between subgroups, female farmers had the lowest mental wellbeing scores, which were significantly lower than the scores of male farmers. However, these differences do not show effect sizes that indicate clinical significance. In addition, there were notably more female farmers with mental wellbeing scores below the cut-off (50; 40.7%) than male farmers (42; 29.5%). These results are consistent with earlier research findings that female farmers experience more psychological distress than their male counterparts[9]. However, the difference observed in the present study is particularly concerning. Although not significant, it is noteworthy that mental wellbeing appeared to decline with age, with farmers aged 18–29 years having the second-highest scores and farmers aged 40–49 years having the lowest scores. It remains unclear, however, why farmers over the age of 50 years had the highest mental wellbeing scores of all age groups. Future research should further investigate the factors influencing this finding.

Facilitators and barriers

The general analysis of facilitators and barriers indicated that the factors farmers perceived as facilitating their wellbeing in everyday life had low or no correlation to their mental wellbeing, while factors perceived as barriers had moderate to high correlations, except among part-time farmers and farmers aged 18–29 years. This may lead to the conclusion that striving to eliminating perceived barriers may be a more efficient strategy for enhancing farmers' mental wellbeing than optimizing perceived facilitators. This was supported by the subsequent regression analysis, which revealed that 29% of the variance in the farmers' wellbeing scores could be explained by the perceived barriers, while only 9% of the variance could be explained by the perceived facilitators. In their systematic review, Younker and Radunovich reported that interventions focusing on mental health literacy appear to be helpful and concluded that further health promotion research and policies investigating this type of intervention for farmers are needed[3]. Considering that mental health literacy interventions seek to reduce barriers to mental wellbeing, the findings of this study support this conclusion. However, future qualitative research should further investigate the specific perceptions of farmers on how and why perceived barriers seem to be more important for their mental wellbeing than perceived facilitators.

Applying a model to drivers of farmers' mental health

Employing Younker and Radunovich's model[3], the present study's findings indicate that financial wellbeing and social support are the primary facilitators and barriers to farmers' wellbeing. Among almost all subgroups, a secure economy was perceived as the most facilitating factor, and an unstable economy was perceived as the most important barrier. This was also supported by the results of the regression analysis, as an unstable economy was shown to

have a significant negative correlation with mental wellbeing scores. Multiple international studies[1,2,10,13,26] in addition to earlier data from Norway[6] have reported the relevance of economic stressors on farmers' risk of depression or suicide. Although earlier research has suggested that part-time farmers may encounter fewer economic stressors than full-time farmers[6], data from the present study indicated that both groups perceive a secure economy and an unstable economy as equally important. Considering the developments of recent years that have caused increased economic pressure as a result of the energy crisis and supply chain cut-offs associated with the COVID-19 pandemic and the war in Ukraine[11], policymakers should seek to implement strategies to economically support farmers in order to reduce the pressure that, as shown in this study, significantly and more than other factors affects their mental wellbeing.

Social networks within and outside of agriculture, and appreciation for their work, were other key facilitators or barriers for the farmers in the current study. These results are in line with a recent report by Logstein and colleagues[8]. Lack of a social network was also described in a report by Goffin[1], and a lack of social support was identified as a risk factor for suicide among farmers in the review by Younker and Radunovich[3]. Interventions that assist farmers in building networks within and outside the agriculture community should thus be prioritized. Based on the data from the current study, it remains unclear how farmers interpret appreciation for their work. On an economic level, this could be interpreted as the receiving of appropriate pay for their work, although it could additionally relate to how farmers and their work are perceived by society. Traditionally, work in agriculture is often characterized as unattractive, boring, and dirty[27], and farmers deal with several stereotypes, including, for example, the stereotype of being uneducated[25]. In reality, however, farming requires a diverse set of skills and knowledge, comprising practical skills, knowledge of handling animals and crops, the repair of increasingly more complex machinery, and business administration. This discrepancy may lead farmers to perceive that they and their work are not sufficiently appreciated. Future studies should further investigate this factor.

Considering only this study's descriptive analysis, physical health appears to be a less important driver of farmers' mental wellbeing. Regression analysis, however, showed the perception of poor physical health to be a barrier that significantly influenced overall mental wellbeing scores, which is in agreement with the results of previous studies[2,9,26].

Limitations and strength

To our knowledge, this is the first study to investigate perceptions of facilitators and barriers to farmers' mental wellbeing in such detail – in Norway at least. The rather large and diverse sample for an exploratory study provided the opportunity to not only investigate these factors across all farmers, but also compare differences between subgroups, including subgroups based on gender, age, and full-time and part-time schedules. Unfortunately, the sample was not diverse enough in the participants' type of agricultural production to analyze the data based on this variable. No data on farm size and number of livestock was collected. Future study should look at these variables, to further investigate if

these may influence how and to what degree farmers perceive different facilitators and barriers, depending on farm size or number of livestock.

The most important limitations of this study were its cross-sectional design and recruitment methods. Due to its design, the study could only assess connections and correlations between variables, not causes. Larger cohort studies are needed to investigate causal relationships and explain possible changes over time, such as the reason farmers aged over 50 years had the best scores for mental wellbeing despite wellbeing scores otherwise showing a tendency to decline as farmers age. In addition, a mixed-methods design, as applied by Hagen and colleagues in Canada[13], with additional interviews, could further strengthen the results. Also, there is a chance that participants interpreted the categories differently. Therefore, cognitive interviews that investigate participants' understanding of the categories would be needed. This was not feasible in the scope of this exploratory study, but should be done before applying these categories in future studies.

Recruitment for this study was performed using social media platforms, which kept the researchers from being able to report a response rate. It is possible that farmers who were already aware of mental wellbeing and mental health in agriculture were more likely to respond to the questionnaire, leading to higher severity in the results and selection or recruitment bias. It is also possible that farmers already experiencing mental health struggles may not have the mental capacity to engage in social media or respond to surveys, which may have excluded some of the most concerning individuals in this population.

This study employed the WHO-5 Well-Being Index, in contrast to previous studies that utilized the Hospital Anxiety and Depression Scale (HADS) to measure symptoms of depression and anxiety[6,15]. The former measure was chosen to reduce the complexity of the survey for the participants, who were asked to respond to five instead of 14 items, but it limits the comparability of the results of this study with those of previous studies. Follow-up studies should therefore include the HADS as an outcome measure.

Conclusion

The findings of this study present the current state of mental wellbeing of farmers in Norway. The observed mental wellbeing scores are concerning. Policies in uncertain times, when every country needs to build efficient and independent food supply chains, should aim to support farmers financially, as economic concerns appear to be the factor that is most important to farmers' mental wellbeing. Farming should therefore be a profession that takes national priority. Future studies should further investigate differences between age groups and how farmers define receiving recognition for their work.

Impact on rural health practitioners

There is a need for preventive measures and interventions aiming to minimize barriers with a focus on supporting secure economics, social networks within and outside of agriculture, farmers' physical health, and appreciation for farming. For those working in farmers' health, the findings may highlight the importance of focusing on preventive health measures, particularly known causes of depression. It might be beneficial to enhance the knowledge of

advisors regarding symptoms they can observe. The lack of recognition – which have been shown as one of the main barriers – could potentially be addressed by increasing consumer awareness and strengthening the farmer's role in society.

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