

Abstract

Objectives: Agriculture in the United Kingdom (UK) continues to be one of the most dangerous occupations, accounting for around a fifth of fatal workplace injuries and many other injuries, both major and minor. This study examines young farmers' awareness of, attitude to and behaviors around safety practices on-farm.

Method: A survey was undertaken amongst a group of young farmers aged sixteen and over who were actively engaged in farming in Northern Ireland, focusing on attitudes and behaviors towards safety on-farm. Drawing on previous literature, this study examined whether younger farmers demonstrate a higher degree of risk tolerance and are more likely to engage in risk taking behavior when undertaking routine farming practices leading to potential injuries and lost working days. The young farmers surveyed were classified into three groups and differences in risk perception examined.

Results: The results indicate that statistically farmer age, intensity of farming alongside the level of farming experience contribute to incident occurrence. Our results indicate a need for attitudinal and behavioral change particularly around risk-taking behaviors which ultimately result in farm incidents, impacting on both the performance of the farm business and individual farmer well-being.

Conclusion: Policies aimed at addressing perception and acceptance of risks among farmers are recommended.

Keywords Farm safety, young farmers, risk awareness, attitudes, behaviors and practices

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Agriculture (Q1)

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Introduction

Globally, in terms of work-related injuries and fatalities, agriculture is one of the most dangerous industries to work in [1]. According to the Health and Safety Executive (HSE), agriculture in the United Kingdom (UK) has the highest rate of worker fatalities (per 100,000) across all sectors: 20 times higher than the overall average rate [2].

The majority of Northern Ireland's (NI's) 25,000 farms are small family operated businesses specializing in livestock production namely beef, sheep, and dairy [3]. In NI, the agriculture sector continues to persistently account for most workplace injuries and fatalities [4]. While the trend in farm fatality rates has on average fallen over time, relative to other UK regions NI fatality rates are still higher. For example, over the period 2005-2017 the fatality rate was 1.16 per agriculture worker in NI compared to 1.14 for Great Britain (GB) [2]. In 2018, in NI, eight farming related fatalities were recorded [4]. Furthermore, the number of minor farming related incidents (i.e. those injuries sustained while engaging in farming activities but not requiring professional medical intervention) and major farming related incidents, (i.e. injuries sustained while engaging in farming activities and requiring professional medical intervention) continue to remain at a persistent level; estimates show that in terms of workdays lost in NI, the estimated aggregate value stands at more than 18,000 workdays lost every year [5].

Farming is different from other business sectors due to the nature of it being a family business with farms normally providing both a workplace and a family home. For this reason, young people who grow up on farms can be exposed to a higher level of risks from an early age compared to their non-farming cohorts [6]. Furthermore, young people growing up on a farm tend to be socialized into farming and participate in farming activities often from an early age, for example, feeding and handling animals and/or operating machinery. Although this can bring positive benefits, it also has the potential, if their exposure to dangers or risks are not managed properly, to impact on both physical and mental welfare [7, 8].

Young and inexperienced agricultural workers have been shown to be at a greater risk of experiencing injury [9-11]. In Austria, farmers under 40 years old form over two thirds of agricultural incidents [12] and in Michigan, U.S. workers under 35 years old accounted for 39% of hospitalizations from agricultural incidents [13]. Both the lack of knowledge and a lack of situational awareness are often listed as reasons why younger farmers exhibit risky behavior, can make rash decisions and are involved in more incidents when compared to middle aged farmers [26].

Other factors have been shown to also influence younger farmers' injury rates such as their behaviors and approaches to safety [14]. Inexperience can lead to complacency and/or rushing when undertaking farming tasks and this has also been shown to contribute to higher levels of risk tolerances, a predictor of incidents and associated injury [15]. Younger individuals can exhibit behaviors where they are observed to think and act with an "optimistic bias" towards incidents. Examples include taking the view that trauma and injury won't occur to them; reflecting a sense of invulnerability, increasing risk taking behaviors resulting in agricultural incidents and injuries [16]. Beyond attitudes and behaviors in relation to good farm safety practices it has also been shown that younger farmers or early-stage farmers may not have adequate levels of resources to purchase safety related equipment or to implement safety changes and practices [17].

In addition to age, many factors play a role in determining attitudes towards risk, including time pressures throughout the day, tiredness, gender, social norms and stress [14, 18]. Particularly in relation to younger farmers, it has been shown that the views and behaviors of family, friends and peers influence individual attitudes to risk [26]. An individual's perception of social norms around farm safety practices is an important predictor of farmers' behaviors, especially when it comes to risk taking [19, 20]. Continual exposure to family member's or peer's risky behaviors, such as an unwillingness or resistance to the use of safety equipment

(for example, seatbelts, roll over systems or PTO covers) or failing to undertake necessary safety checks before using machinery can directly impact on an individual's attitude to risk [27]. A recent study in the United States highlighted learned behavior between inter-generations of farm family members resulted in younger farmers continuing to display unsafe behaviors while working. In this study, the younger farmers surveyed adopted the same practices as the older generation with 78% choosing not to wear a seatbelt while 46% indicated that they would go ahead and use a tractor if it had no roll over protection [21].

Research evidence indicates that central to bringing about improved farm safety practices amongst the younger farming population is the need to identify current attitudes, behaviors and approaches to safe working practices on the farm and to gain a better understanding the types and frequency of incidents that are occurring amongst younger farmers and their impact. This study aims to examine the attitudes and behaviors of younger farmers towards farm safety and to identify how safety at the farm level can be improved.

Methodology

The study surveyed young actively farming farmers aged 16 years and older in Northern Ireland through a regionally based organization, the Young Farmer's Club (YFCU), on farm safety. Discussions with representatives of the YFCU indicated that the population relating to this cohort within this sample group would be around 800 individuals. An online survey was conducted between January and February 2021. The total number of respondents was 219, giving a response rate of 27%.

The questionnaire consisted of five sections which focused around the individual's current level of involvement in farming, the concept of and attitudes towards safety on the farm, their farm safety training, the farm business and the individual. An important focus was to assess individuals' concepts of and attitudes towards safety on the farm and a set of questions was included around participants' attitudes towards risk.

Based on the types of farm work undertaken, individuals evaluated when they considered that they were most likely at risk of being involved in an incident, for instance when handling animals, when using large or small equipment or machinery, general farming activities or when working with a quad bike, slurry or at a height. Participants were also asked to evaluate the frequency of potentially unsafe farming activities that they had recently engaged in. Their responses were used to estimate their risk tolerance. In addition, questions were also included to assess and evaluate their working practices; for example, taking time to make sure things were done safely, the importance of work-life balance and the importance given to assessing dangerous situations. The section also focused on incidents and near misses, workdays lost, causes and type of medical attention required for both the participant as well as incidents involving other family members.

Participants were then divided into three groups; those respondents who had experienced a major injury in the previous 12 months, respondents who had a minor injury and those who had no incident. The aim was to assess whether individuals experiencing a major incident exhibited a higher risk tolerance. Major injury was defined as an incident that occurred in the past 12 months and required medical attention that resulted in a visit to a hospital or GP surgery. Only one option could be picked for the cause of the major injury, which was not the case for the minor injuries. For minor injuries the respondents could select if more than one minor injury had occurred. Minor injury was defined as an incident that occurred in the past 12 months and had not required medical treatment at a hospital or GP surgery.

The study used qualitative methods to explore attitudes based on participants' responses to a number of behavioral questions. Results were analyzed to evaluate the behaviors associated with greater risk acceptance and higher incident rates associated with younger farmers.

Results

Type of injury/no incident

Eighty percent of respondents were in the under 30 age group, 8% were aged between 30-35 years and the remainder were above 35 years of age. Seventy-eight percent of respondents lived in households which comprised of between one and five household members. Overall, 56% of the survey respondents were female and 44% male. Seventy two percent of respondents were living with their parents and 22% lived with their spouse or partner. The majority of those surveyed did not have children (85%). The majority (72%) were working on farms officially designated as a disadvantaged land area and 21% worked in lowland, non-disadvantaged land areas. The main farm types dairying (37%), beef (32%), sheep (21%) and other (11%).

The results indicated that 10% (22) of the respondents reported experiencing a major injury, 47% (102) had a minor injury and 39% (95) had a no incident over the previous 12 months. Most incidents occurred on dairy farms, on which 45% of the major injuries and 37% for the minor injuries were recorded, followed by beef farms (18% major injuries and 35% minor injuries). In terms of main causes of incident, animal handling incidents occurred most frequently causing 27% of incidents. Using a quad bike, getting injured when using a hand tool and operating equipment, mainly tractors and larger machinery accounted equally for 14% of the incidents. A slip or fall to the ground and lifting heavy objects both accounted for 9% of incidents.

Table 1 outlines how often respondents undertook specific routine activities on their farm which may expose them to the risk of injury, grouped by incident type. The underlying hypothesis is that people belonging to the major injury group are more accepting of risk and undertake activities that could lead to a higher chance of injury compared to the other two groups. Moreover, it might be expected that the minor injury group is more risk prone than the non-incident one.

[Table 1 here]

To illustrate this, all the respondents that experienced a major injury reported they either often or sometimes had handled an unrestrained animal. The same was valid for 93% of the minor injury group and 79% of the no incident group. Similar patterns can be seen when it came to taking a risk while working at a height, with 36% of the major injury group indicating they had never done this compared to 43% of the minor injury and 51% of the no incident group.

Subjective working conditions were then explored further by asking respondents if they had worked on the farm while feeling sick; feeling tired; taken shortcuts to save time and worked under the influence of drugs and/or alcohol. Figure 1 outlines the three groups reported frequency of engaging in activities that increased the risk of an incident occurring. For instance, all respondents who reported a major injury in the past 12 months indicated that they had either sometimes or often worked when feeling sick compared to 91% of those in the minor injury group and 82% of the no incident group.

[Figure 1 here]

For the three groups, Figure 3 outlines the overall responses to the question of the perceived risk of being involved in an incident. Interestingly, both major and minor injury groups perceived handling animals as an activity involving a high risk of an incident at 73% compared to 68% of the no incident group.

[Figure 2 here]

Working at a height and working with slurry were the activities which individuals thought placed them at the highest risk of an incident. Sixty-eight percent of the major injury group found it either likely or very likely that an incident might occur when working at a height; with 63% of the minor injury group and 49% of the no incident group also identifying this. In the most instances, major injury respondents demonstrated they were aware of the risk, even more so than the other two groups, but their behaviors and actions did not always reflect this or mitigate against those risks as demonstrated in Table 1 and Figure 12.

[Figure 3 here]

Figure 4 further illustrates the trend that respondents with a major injury displayed higher risk acceptance. For instance, nearly 60% of the major injury group agreed or strongly agreed that injuries and incidents are part of the job compared to 45% minor injuries and 34% of no incident instances.

When it came to hours worked on the farm, 63% of those who had experienced a major injury worked between 0-30 hours on the farm. The major injury group had a higher percentage of individuals working more than 30 hours a week on the farm compared to the minor injury group and the no incident one.

When respondents were asked to consider who they think is most likely to be involved in a farm incident, just under a third of respondents identified young children as the most likely group of people to be involved in a farming-related incident followed by farmers over 65 (28%).

[Figure 4 here]

As highlighted in Figure 4, the main barriers to improving farm safety were the financial costs of making improvements, time pressures because of farm activities as well as having working commitments off-farm. Amongst all the respondents, financial barriers, time constraints from farming and off-farm work are close to 30% across all incident types.

In terms of factors viewed as having the potential to make the biggest difference in improving health and safety on farm, 34% of respondents indicated that the most helpful factor would be financial help through a grant scheme, followed by training and other courses (26%).

Figure 5 outlines what respondents considered to be the most useful training areas to focus on in relation to on-farm health and safety. Keeping children safe on the farm was given the highest priority followed by animal handling and chemical handling. Overall, all subjects were rated as useful from most of the participants.

[Figure 5 here]

In relation to how health and safety messages and advice is communicated, respondents strongly preferred digital media: i.e., Facebook, Twitter, You Tube, Mobile Apps, online interactive tools (60% finding it definitely useful), followed a combination of Traditional and Digital medium.

Gender

Similar behavior and attitude analysis to the type of injury were conducted by farm type and gender with detailed descriptive statistics outlined in the Appendix. Farming enterprise types were split into dairy, sheep, beef and other.

Examining the results by gender, female respondents seemed to be more risk averse and aware of the dangers compared to their male counterparts, yet both groups displayed a degree of risk tolerance. Looking at differences in male and female responses, the latter seemed to be more aware of the dangers attached to activities, especially when it came to handling animals or using large equipment. For instance, 49% of men and 64% of women agreed or strongly agreed that they always take extra time to make sure things were done safely. Male participants were more likely to, often or sometimes work when feeling sick (98%) compared to female ones (81%). More males (84%) than females (70%) indicated that they had sometimes or often taken a risk or shortcut to save time.

Farm Type

When participant responses were analyzed by farm type, similar patterns as in Figure 1 emerged where dairying and beef enterprises took more risks than the other two groups. For instance, 90% of the dairying group said they had sometimes or often worked when feeling sick. The numbers were comparable across beef (88%), sheep (91%) and, less so, across the other farm enterprises (74%). In contrast, only 16% of dairying and 20% of beef respondents said they had never taken a risk or shortcut to save time. The number stood at 34% for sheep

and 39% for other farming enterprises. Results indicate that most major injuries occurred on dairy farms where respondents in most cases also displayed higher tolerance for risky activities. Handling animals was intuitively perceived to be a greater risk for dairying and beef farms. In general, dairying farms appreciated the risks that using or operating equipment carried, however they seemed to accept that these activities could result in an incident or an injury. Dairy farmers also displayed a higher tendency towards risk taking than the other three farm types. In general, a higher percentage agreed that incidents are 'part and parcel of the job' with nearly half accepting that as a fact while the number was 40% or lower for beef, sheep and other farms. Despite being somewhat more risk prone, dairying and beef farmers also accepted that risky situations are part of the job and displayed a high level of risk awareness.

Discussion

Previous studies have shown that younger farmers are more likely than other age groups to have a farming incident [5, 22]. While a range of factors contribute to this, a higher tolerance to risk amongst younger farmers is an important determinant. In this study, the findings indicate that younger farmers displayed a higher acceptance of risk-taking behavior.

Dairy farming on average carried a higher risk of an incident compared to other enterprise types. This is in line with other studies, such as Watson et al. [23], who found that younger dairy farmers displayed a higher level of risk taking. However, a higher risk tolerance is not the sole contributor to injuries. Other factors, such as stress and tiredness, are also important factors for consideration increasing the probability of getting injured across all farmer age groups [14].

In our analysis, the major injury group spent more time working on the farm. Those who work longer hours on the farm face an increased risk of incident and injury. Previous research has observed, when after controlling for the number of hours worked, different groups can have similar risk exposure to incidents [24].

The level of risk awareness amongst those surveyed who had experienced an incident compared to those who had not, is much less transparent. That is, their level of awareness in relation to undertaking routine farming activities as opposed to being aware of the risks but continuing to engage in risk taking behaviors. For example, male respondents demonstrate a lower awareness of risk in most cases. For surveyed females, their responses exhibited better knowledge and understanding of the risks, however their behaviors around routine farm practices still exhibited risk taking. This finding is supported by previous research with Stave et al. [25] identifying that in research undertaken amongst Swedish farmers, they exhibited an awareness of hazards but there was a divergence between their awareness of risks and their everyday farming practices. Furthermore, a Scottish based study showed that females took risks, often to “prove” themselves and their abilities to their male peers [20]. Therefore, if younger farmers are aware of risks but consider taking risks are justified in some way, either through time pressures or just to get the job done or to prove themselves, then interventions which seek to raise risk awareness may have a limited effect.

The attitude of other family members towards risk (those working in the farm business and household’s social norms) also impacts on the ability to implement improved farm safety practices on farm. In this survey, most respondents were working on the farm, living with their parents and indicated that they looked to other family members for advice on farm safety. Therefore, a collective approach is required when aiming to implement improvements in farm safety practices on farm. For example, training on keeping children safe on the farm, animal and chemical training as well as encouraging the establishment of a farm safety plan/checklists and maintaining a record of minor injuries and near misses which can be reviewed and from which lessons can be learned. Interestingly, tractor driving, though a major cause of incidents, was ranked next to last in terms of preferred training subject, perhaps relating to a confidence bias when it comes to risk-taking activities.

Moreover, it is important that awareness and safety campaigns are focused towards all those working on the farm and the wider farm family household to address misconceptions around farm safety [26]. For example, close to two thirds of respondents perceived that young children and farmers over the age of 65 were the most likely groups to be involved in a farming-related incident. However, recent research undertaken in NI shows that those actively working on-farm and aged between 16 and 40 are the most likely cohort group to be involved in a farming related incident [5].

The young farmers surveyed as part of this study viewed the farming environment itself as a barrier to improving farm safety. Financial pressures and time pressures were identified as the main causes of stress and ultimately, they associated these with stress-induced incidents and injuries. The perception that financial pressures are linked to incidents was consistent across all respondents. Younger farmers were clearly associating, from their perspective, working conditions as important contributors to incident occurrences and injuries. As a group of individuals who are and will be the next generation of farmers, they acknowledged that operating within tight financial margins, working very long hours, often alone and in periods of high levels of work intensity, under the backdrop of policy uncertainty all created situations of additional working stress and increased the potential for incidents to occur. This creates challenges for policy and responsibilities for the wider agri-food industry and retail sector. Given that the agriculture sector in NI has the highest rate of fatal injuries in the UK, and on average, a higher level of incident occurrences, a much more integrated and holistic approach amongst the key stakeholders is required along the food supply chain in order to deliver safer operating practice at the farm level. Regulations should reflect that farms are different than other sectors in being both home and workplace and should recognize and address the cultural perceptions around health and safety for young people on farms [26].

Finally, future research could provide more insight into incidents by deploying statistical analysis. In the case of this study, due to the skewness of the data and its disaggregation into categories, descriptive statistics provided a better framework in analyzing the survey results.

Conclusion

In relation to good safety practices on farm this study has identified that, amongst young farmers, there is a need for attitudinal and behavioral change particularly around risk-taking behaviors which ultimately result in farm incidents, impacting on both the performance of the farm business and individual farmer well-being. The findings highlighted that there is a perception amongst young farmers that incidents were 'part and parcel' of the job and at farm level, this is often viewed as the 'social norm' amongst farm family members. The study highlighted that younger farmers tended to look to other family members for advice on farm safety and that attitude and influence of other family members does impact on whether good farm safety practices are adopted [18]. A collective approach is required when implementing improved farm safety practices on the farm, that is, everyone involved in and working on the farm needs to be involved. For example, young farmers identified their preferred training subjects on farm safety to be on topics such as keeping children safe on the farm, animal and chemical handling.

On-the-job training and demonstration farm visits incorporating farm safety best practice were valued in terms of training and there was an expressed preference for the use of digital communication, i.e. Twitter, Facebook. YouTube for delivering health and safety advice.

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Table 1. Farming work practices by frequency and type of incident.

<i>Work practice</i>	Major Injury				Minor injury				No incident			
	<i>Never</i>	<i>Sometimes</i>	<i>Often</i>	<i>Does not apply</i>	<i>Never</i>	<i>Sometimes</i>	<i>Often</i>	<i>Does not apply</i>	<i>Never</i>	<i>Sometimes</i>	<i>Often</i>	<i>Does not apply</i>
I have handled an unrestrained animal	0%	36%	64%	0%	6%	47%	46%	1%	15%	42%	37%	5%
I have mixed slurry without open access points being guarded	36%	27%	27%	9%	51%	27%	6%	16%	60%	28%	1%	10%
I have used a quad bike without a helmet	9%	36%	55%	0%	7%	29%	54%	10%	15%	27%	40%	18%
I have worked in a house/pen with a loose bull	27%	27%	45%	0%	24%	49%	17%	10%	35%	41%	18%	6%
I have taken a risk when working at a height	36%	45%	18%	0%	40%	49%	4%	7%	50%	44%	4%	3%
I have climbed out of a tractor/machinery cab without applying the brake	55%	36%	9%	0%	59%	31%	6%	4%	68%	23%	8%	1%
I have operated a tractor/equipment on a steep slope which has felt unsafe	27%	55%	18%	0%	31%	60%	1%	7%	47%	46%	1%	5%
I have used equipment without having any appropriate training	9%	55%	36%	0%	20%	53%	24%	3%	27%	59%	13%	1%
I have used a PTO shaft without cover	55%	18%	9%	18%	69%	20%	4%	7%	72%	19%	4%	5%
I have worked on a job knowing there was a chance of getting injured	9%	55%	36%	0%	14%	74%	11%	0%	33%	60%	6%	0%
I have taken on a job knowing it was beyond my experience	18%	55%	27%	0%	33%	59%	7%	1%	45%	51%	4%	0%

Figure 1. Farming work practices by frequency and type of incident.

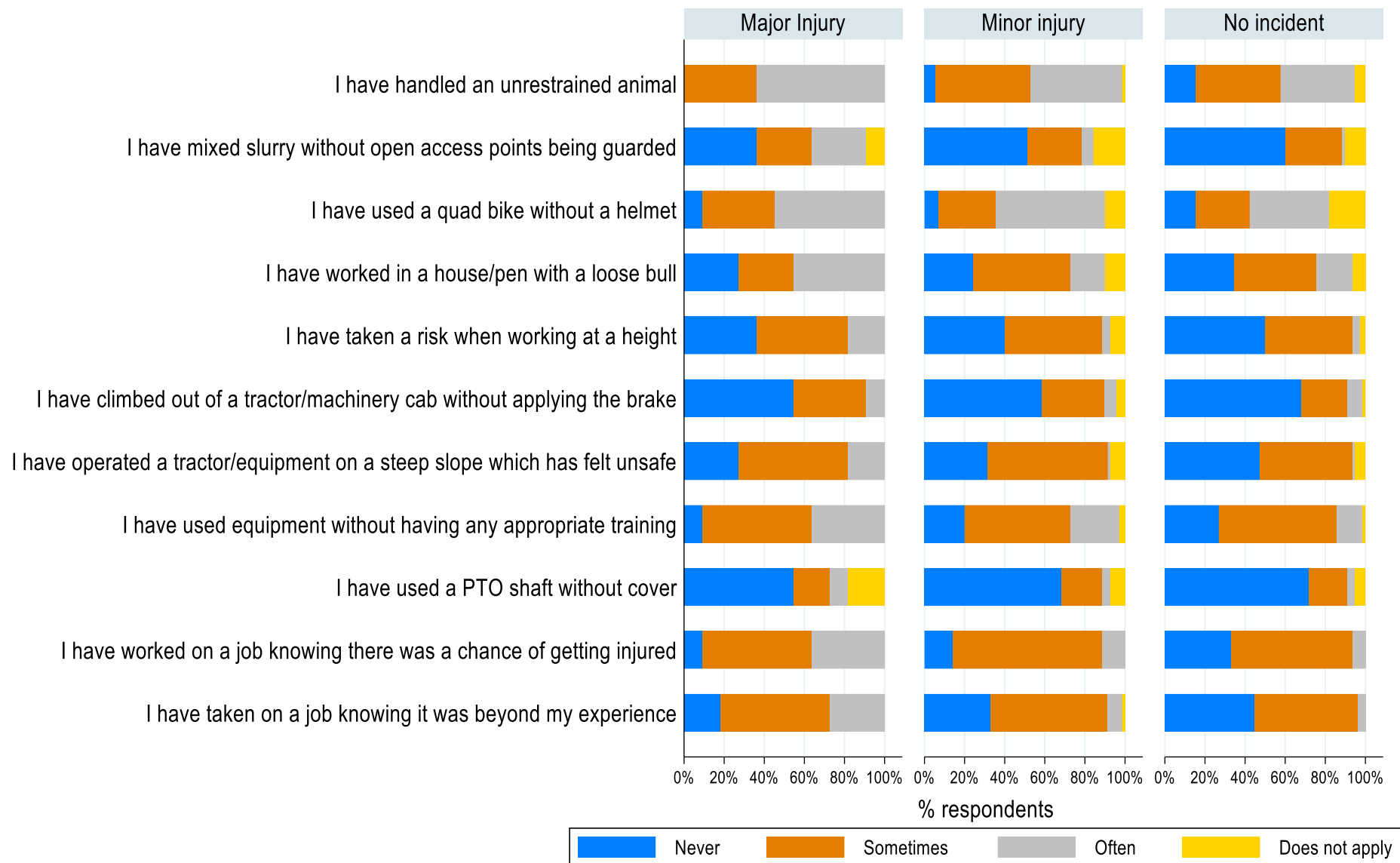


Figure 2. Frequency of subjective working conditions.

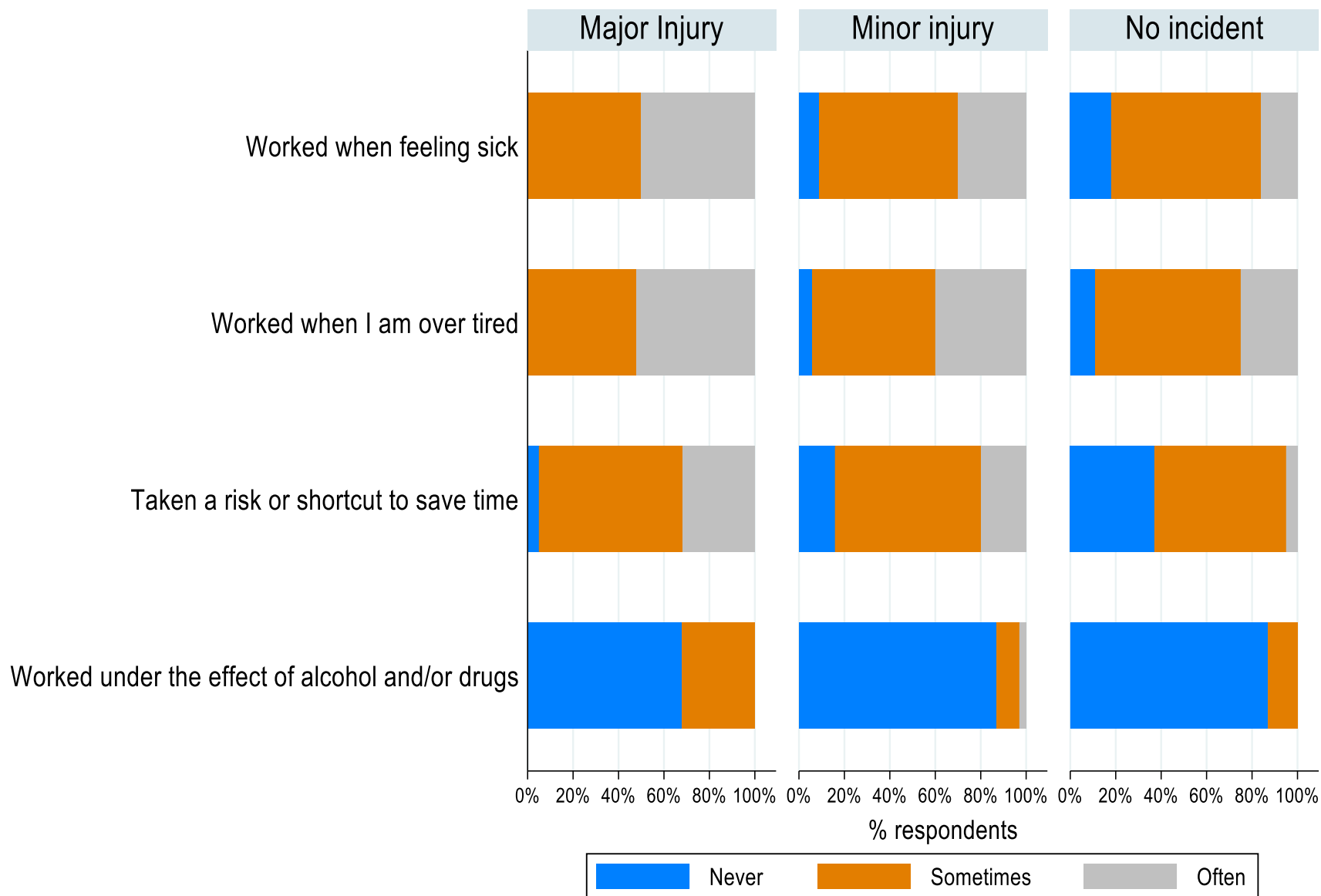


Figure 3. Perceived risk of being involved in an incident by type of incident.



Figure 4. Frequency of risk attitudes by type of injuries.



% respondents



Figure 5. Main barriers to improve farm safety.

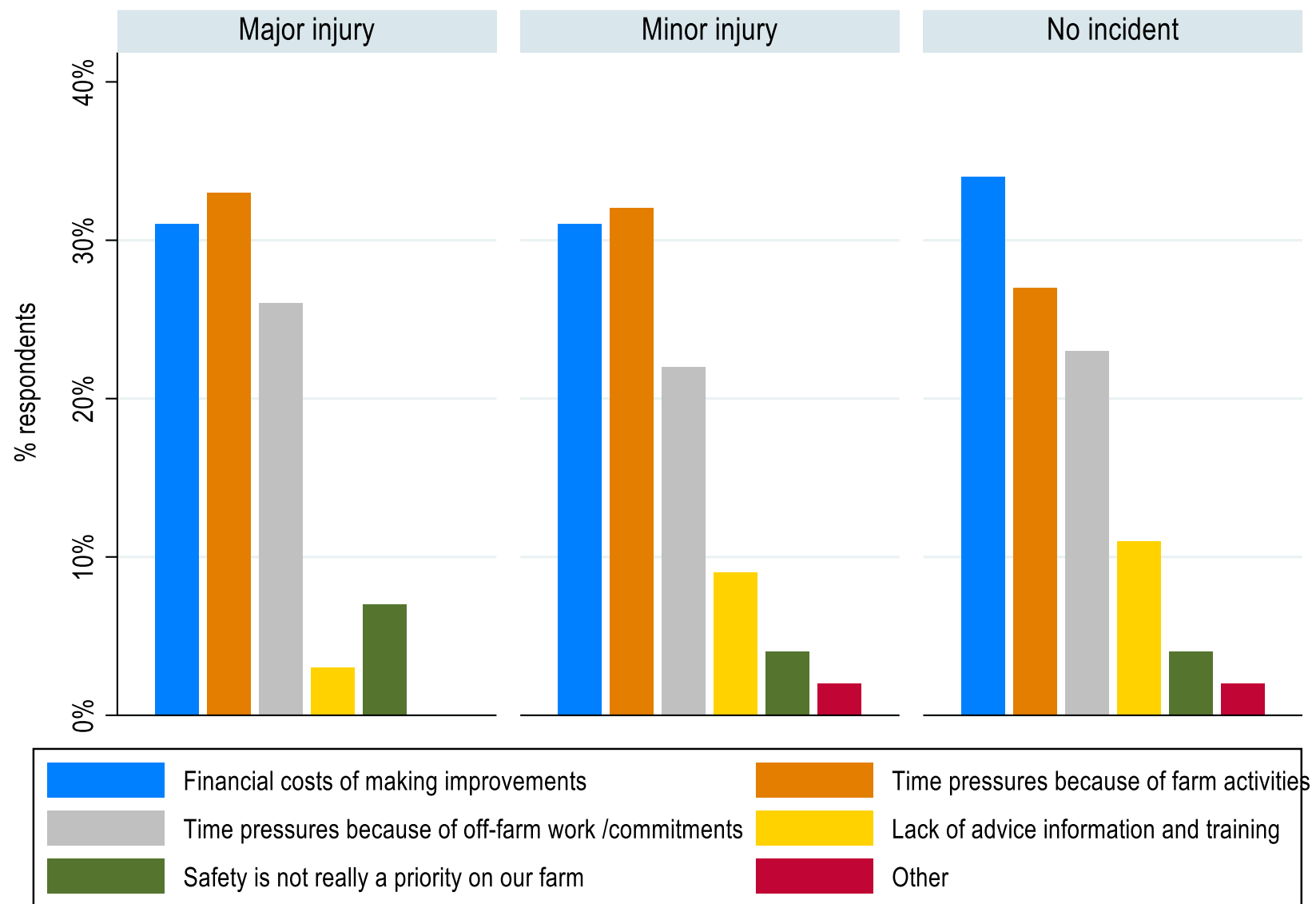


Figure 6. Preferred training subject to improve farm safety.

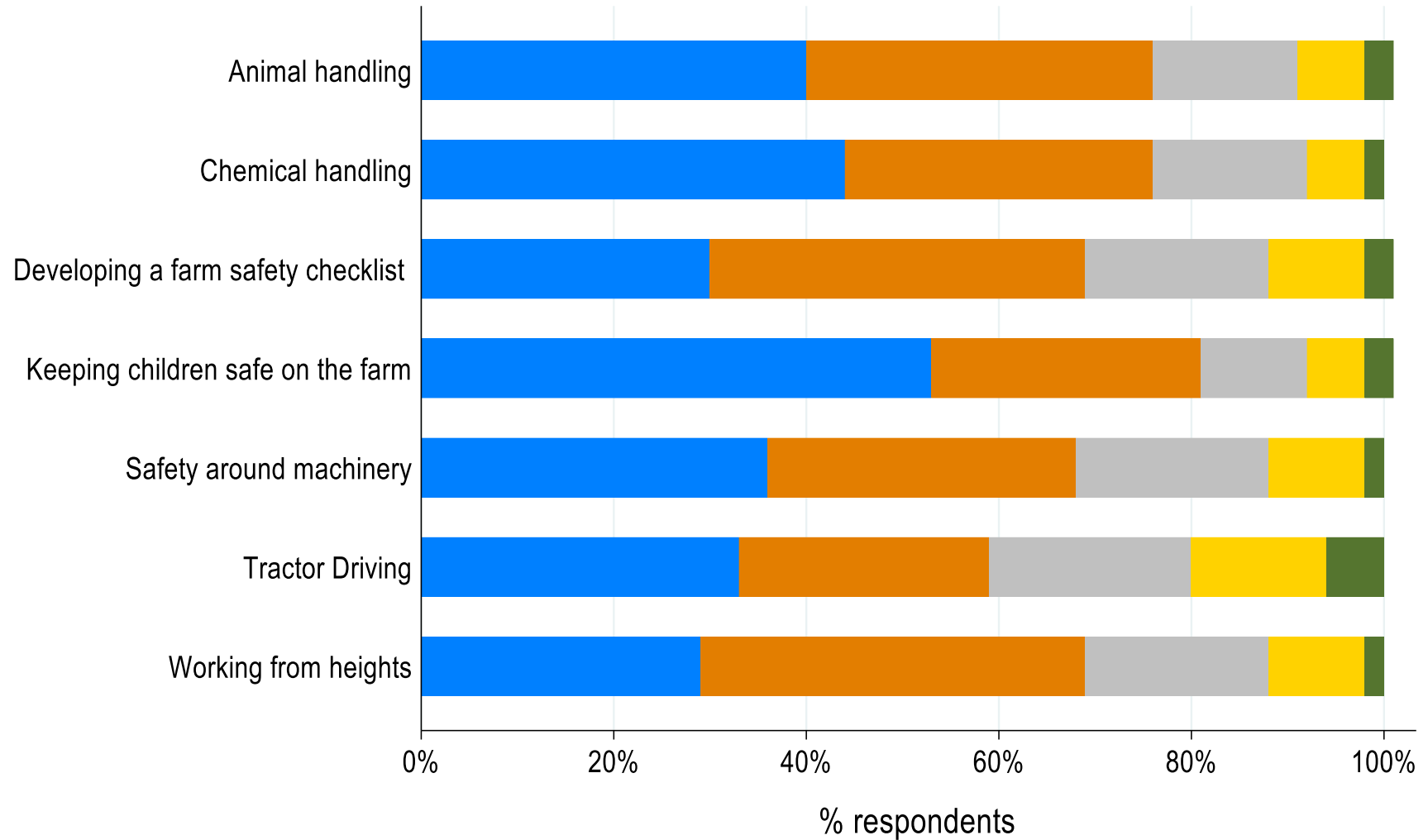


Figure 1 of the Appendix. Farming work practices by farm type.

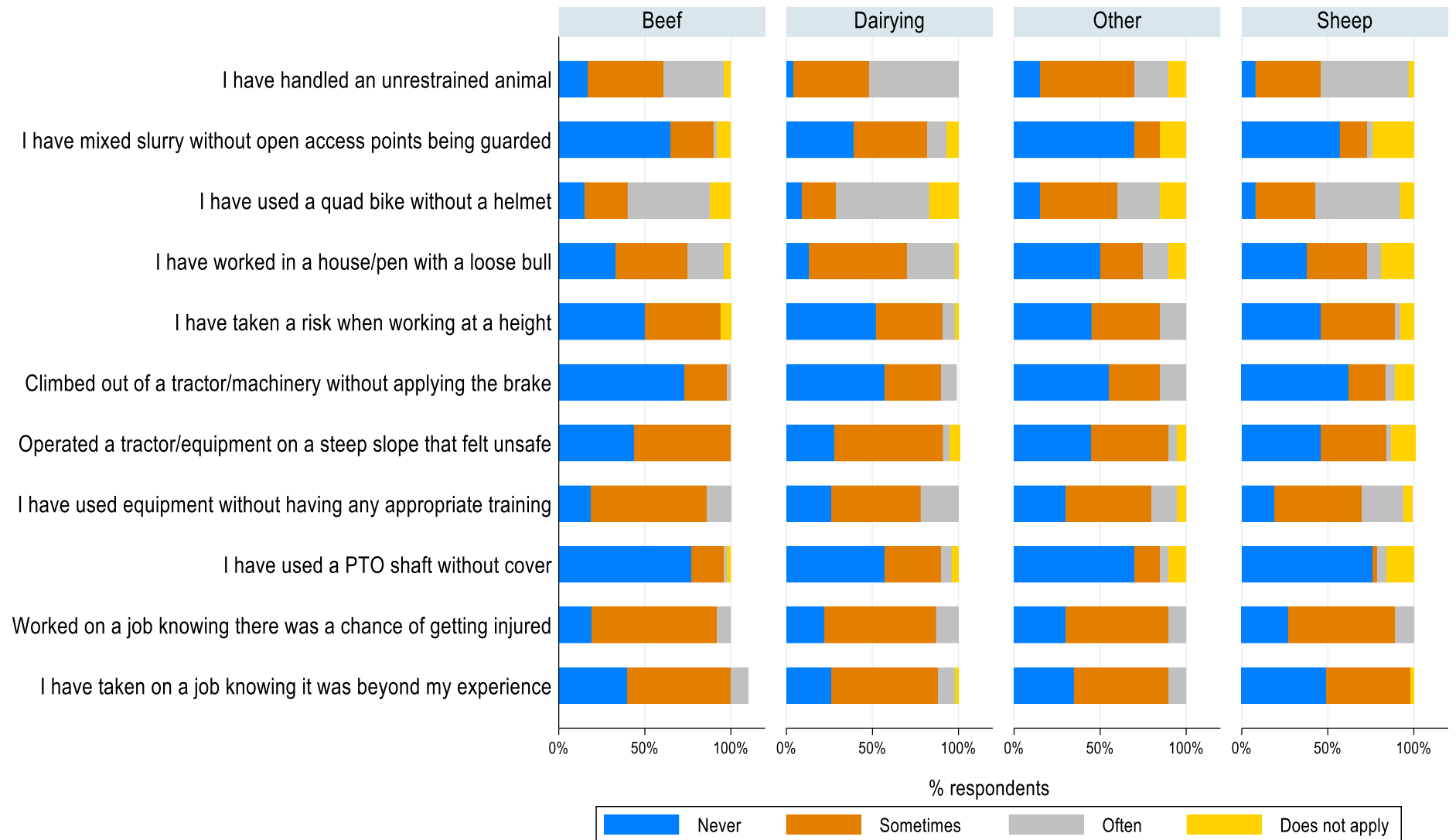


Figure 2 of the Appendix. Frequency of subjective working conditions by farm type.

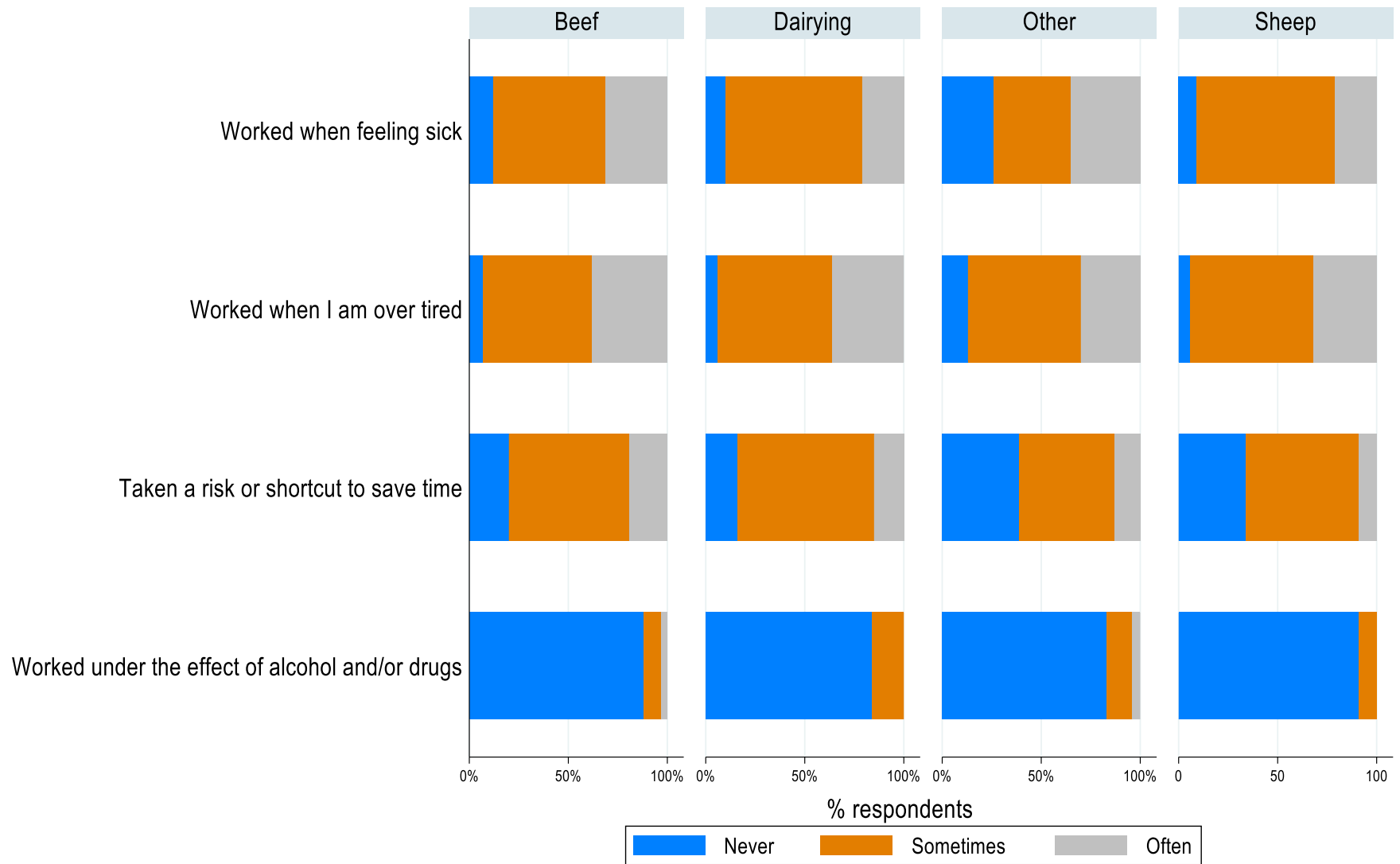


Figure 3 of the Appendix. Frequency of risk attitudes by farm type.

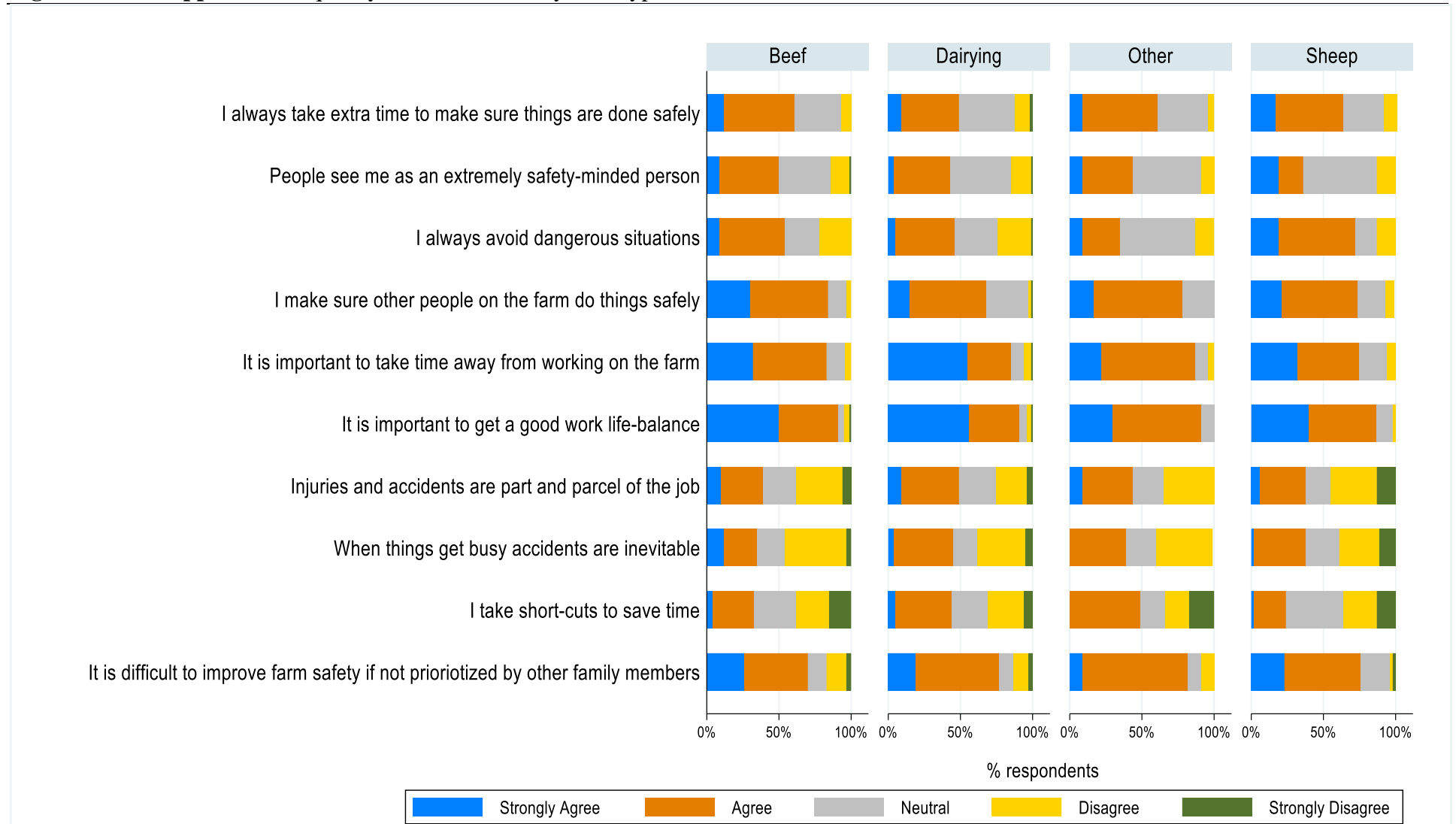


Figure 1 of the Appendix. Farming work practices by gender.



Figure 2 of the Appendix. Frequency of subjective working conditions by gender.

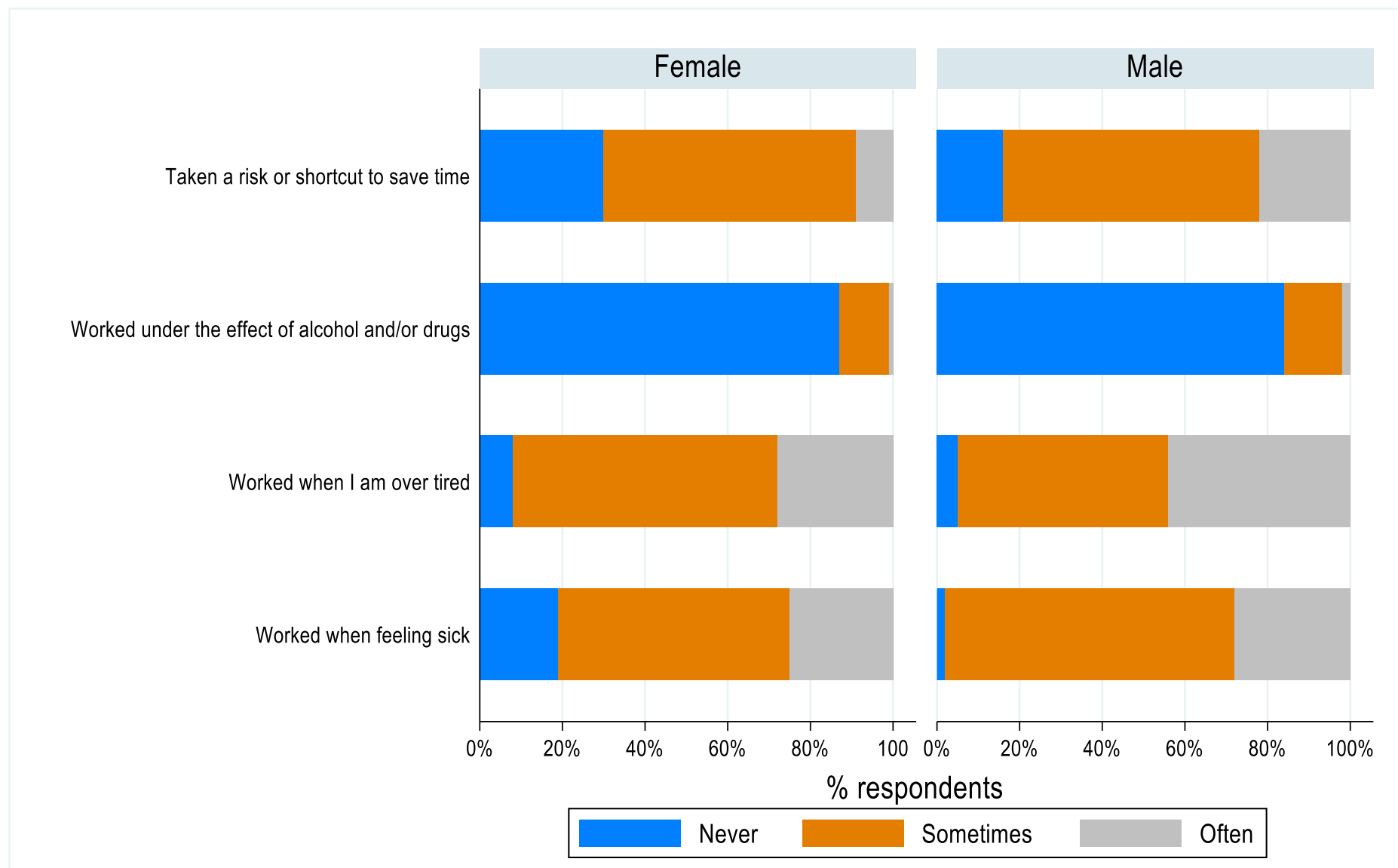


Figure 3 of the Appendix. Frequency of risk attitudes by gender.

