



Identifying farmers' perceptions of farm accident causes

Machinery/vehicles ranked highest for accident causation.

TEAGASC research reveals that future health and safety communications to farmers should focus on objective data.

Improving the safety record of the farming sector is a key goal of both State and farming organisations in Ireland. Knowing how farmers conceptualise accident causation is crucial to guide effective communications strategies for farm safety. This article describes the opinions of a large sample of Irish farmers on accident causation. The article is framed in the context of contemporary accident causation theory.

Accident causation theory

An accident is defined as an event that leads to bodily injury. The public health model (PHM) of accident causation conceptualises an accident as occurring due to multiple interacting physical and human factors (Runyan, 2003). In this model, a transfer of energy is the vector that causes injury and where a time dimension leads to all factors occurring in the same time and place. Runyan (2003) proposed that the social-ecologic framework as described by Bronfenbrenner (1979) enhances the PHM model (**Figure 1**) of accident causation, as it defines various levels of the social environment in concentric nested roles of intrapersonal and interpersonal factors, as well as institutional and cultural elements, which are influential on persons related to accident prevention. Regarding accident prevention models, the conceptual work of Haddon (1980) indicates that accidents are prevented by applying multi-faceted approaches, including both physical and organisational measures.

Study methods

Teagasc provides half-day training on the completion of the Health and Safety Authority (HSA) Risk Assessment Document (RAD) to

farmers. During the piloting phase of these training courses, participants were asked to individually rank their opinion of the causes of farm accidents on a ranking card from first to fifth. An objective of this exercise was to gain information on farmers' perceptions of farm accident causation.

In total, 1,151 farmers completed the ranking cards during the training, with a total of 5,029 accident causes being identified. To analyse the data, first-ranked accident causes were each allocated a weighting of five, and sequentially each rank was allocated a lower weighting, with fifth-ranked cases allocated a weighting of one. First-ranked scores are taken to indicate what is most prominent in farmers' minds in relation to accident causation, while the total score provides a more broadly based ranking with all scores included. Data collected was compared with objective fatal farm accident data for the previous ten years presented in the pilot RAD (HSA, 2006).

Study findings

The study findings presented in **Table 1** indicate that 92 % of first-ranked scores were related to 'machinery/vehicles' (55 %), 'organisational' (27 %) and 'livestock' (10 %). For total scores, six scores contributed to 96.5 % of the total, with 'slurry related', 'trips, falls, buildings related' and 'electrical' being the additional causes. Notably, 'children', as associated with farm accident occurrence, was ranked low at 1 % of first-ranked causes, while the issue of older farmers having a farm accident received no ranking whatsoever. Within the 'machinery/vehicles' category, accidents associated with 'power take off (PTO)/power shafts' accounted for 56% of the first-ranked and 46.9 % of all-ranked accident causes. Within the 'organisational' category, 'carelessness and rushing' accounted for

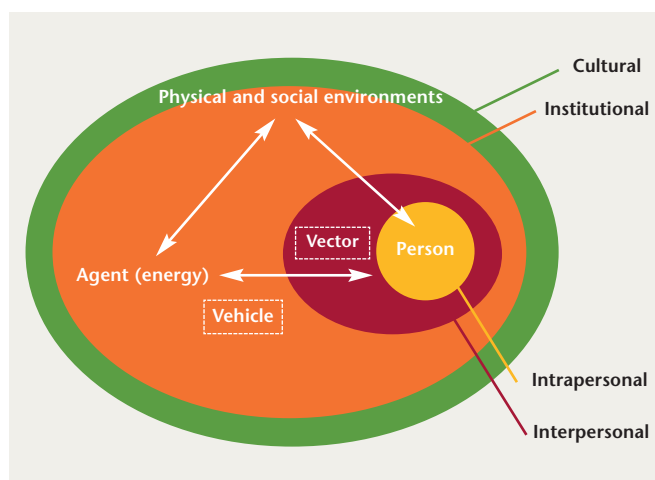


FIGURE 1: Integration of the public health model and social-ecologic framework of accident causation. Source: Runyan (2003).

84.1 % of first-ranked and 65.5 % of all-ranked causes. The findings of this study indicate that farmers attributed farm accidents mainly to a number of physical causes and work organisation issues, which is in accord with accident causation theory. However, the data presented in **Table 1** indicates that participants' perceptions of accident causation were not in line with the actual causes of fatal farm accidents as described in the pilot RAD. For instance, data from the pilot RAD indicated that 32 % of fatal farm accidents in the 'vehicle and machinery category' were entanglements in PTO/power drives, while ranking card responses attributed almost 47 % of accidents to this cause. Furthermore, the pilot RAD indicated that 20 % and 38 % of accidents, respectively, were associated with children and older farmers (over 65 years old).

Conclusion

Overall, this study indicates that farmer perceptions of accident causation are broadly based; however, they were inaccurate when compared with objective fatal farm accident data. Thus the study suggests that communicating accurate and contemporary occupational safety and health (OSH) messages to farmers based on objective data is likely to be a crucial requirement to make progress with accident prevention in agriculture.

Further reading

This article is based on the recently published paper: McNamara, J., Griffin, P., Phelan, J., Field, W.E. and Kinsella, J. (2019). 'Farm health and safety adoption through engineering and behaviour change', *Agronomy Research*, 17. Available from: <https://doi.org/10.15159/AR.19.151>.

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Table 1: Ranking of causes of farm accidents in order of importance.

Accident causes	Ranking order	
	First (%)	Total (%)
Machinery/vehicles	55	31.6
Organisational	27	21.3
Livestock	10	18.4
Slurry related	4	13.2
Trips, falls, buildings related	2	7.2
Electrical	1	4.8
Children	1	1.3
Chemicals	0	0.7
Other	0	1.5
Total	100	100

References

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Harvard University Press, Cambridge, MA, USA, 330 pp.

Haddon, W. Jr. (1980). 'The basic strategies for preventing damage from hazards of all kinds'. *Hazard Prevention*, 16, 8-11.

Health and Safety Authority (HSA). (2006). 'Code of Practice/Risk Assessment Document for Preventing Injury and Occupational Ill Health in Agriculture'. Health and Safety Authority publication, Dublin, Ireland. 124 pp.

Runyan, C.W. (2003). 'Back to the Future – Revisiting Haddon's Conceptualisation of Injury Epidemiology and Prevention'. *Epidemiologic Review*, 25: 60-64.

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