

A qualitative study exploring poultry farmers' barriers and motivations to seasonal human influenza vaccine uptake as a preventive public health measure because of avian influenza

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Abstract

Background: The global spread of highly pathogenic avian influenza (H5N1) has increased concerns about reassortment between avian and human influenza viruses and the potential emergence of novel pandemic influenza strains. Annual seasonal influenza vaccination can reduce this risk and is recommended by the Dutch government and the World Health Organization (WHO) for risk groups, including poultry farmers. This study explored Dutch poultry farmers' perceptions regarding this vaccination and identified motivations and barriers influencing their willingness to be vaccinated.

Methods: This qualitative study involved semistructured interviews with twelve poultry farmers in the Netherlands. Interviews were conducted online via Microsoft Teams between June and October 2024. The interview guide was based on the attitude–social influence–self-efficacy (ASE) model. Interviews were transcribed verbatim and analysed using thematic analysis.

Results: Attitudes towards vaccination differed both generally and regarding seasonal influenza vaccination due to avian influenza risk. Approximately half considered vaccination a reasonable preventive measure. The main motivation for vaccination was preventing reassortment between avian and human influenza viruses and thereby reducing the risk of a future pandemic. Participants also viewed vaccination as a sign of societal responsibility and a way to contribute positively to the public image of the poultry sector. Important barriers included diminished trust in the government, perceived regulatory burden within the poultry sector, and perceived limited benefits of vaccination. Participants emphasized that vaccination should remain voluntary.

Participants generally perceived their personal risk of avian influenza infection as low, while acknowledging potentially severe consequences for public health if a novel influenza virus were to emerge. Trusted sources of information included veterinarians, general practitioners, poultry advisers, and agricultural organizations. Accessibility was considered essential: local, flexible in timing, and free of charge.

Conclusions: Acceptance of seasonal influenza vaccination among poultry farmers is influenced by a combination of societal responsibility, perceived risk, trust in the government, and practical considerations. Vaccination strategies should emphasize the societal benefits of vaccination and the potentially serious public health consequences of the emergence of a novel influenza virus. Improving vaccine uptake among poultry farmers requires engagement of trusted intermediaries and vaccination programs that are accessible and tailored to farmers' practical needs.

Background

Reassortment between avian and human influenza viruses poses a continuous risk of emerging types of influenza viruses, with the potential to cause a pandemic. This risk is considered low but has increased in recent years due to the global spread of a variant of H5N1 avian influenza (subtype H5 clade 2.3.4.4b). This H5N1 subtype not only infects many wild birds and poultry but also affects different types of

mammals and, yet rarely, humans.¹ In the United States of America, this H5N1 avian influenza subtype is increasingly causing outbreaks among poultry and cattle. Human infections have also been reported with increasing frequency, of which at least two were fatal.² Additionally, in the Netherlands, a watery country in Europe with several regions with high poultry density,³ outbreaks with avian influenza among poultry have occurred in recent years. In addition, two cats on a Dutch farm recently tested positive for avian influenza, and on the same farm, H5N1 antibodies were detected in a cow, indicating a past infection.⁴ To date, no human infections with H5N1 have been reported in the Netherlands (July 2026).

One of the preventive measures recommended by the WHO and taken over by the Dutch government to reduce the risk of reassortment of human and avian influenza viruses is annual seasonal vaccination against the human influenza virus of people at risk of avian influenza. This includes poultry farmers and employees involved in avian influenza outbreak control at poultry farms.^{5,6} The Dutch government is considering a vaccination campaign among these risk groups as part of a prevention plan for bird flu.⁶

The Municipal Public Health Service (MPHS) Gelderland-Midden is located in a region with a high density of poultry farms,³ and has been involved in several outbreaks of avian influenza at poultry farms in the region in recent years. During these outbreaks, the MPHS offered antiviral medication and, only during the influenza season (autumn and winter seasons), human influenza vaccination to poultry farmers. The MPHS observed that poultry farmers and their employees often do not accept influenza vaccination as a preventive measure during avian influenza outbreaks. Earlier research performed among Chinese poultry farmers during an avian influenza A/H7N9 outbreak found that poultry farmers' personal risk perceptions were low, as was their adherence to personal protective behaviour.⁷ Although some quantitative studies exist, including a recent (April 2025) assessment of awareness and uptake of seasonal influenza vaccination among poultry workers and people in direct contact with birds showing low vaccination uptake⁸, the available evidence provides little in-depth insight into the underlying factors influencing vaccination acceptance.

To optimize seasonal influenza vaccine uptake among poultry farmers and their employees in the Netherlands, we performed a qualitative study to gain deeper insight into poultry farmers' attitudes toward, motivations for and barriers to seasonal human influenza vaccination as a preventive public health measure because of their risk of avian influenza infection.

Methods

Research design

A qualitative study using semistructured interviews was conducted between June and October 2024.

Selection of participants

Participants were poultry farmers and their employees who (1) were in regular contact with poultry, (2) were aged 18 years or older, and (3) lived in the Netherlands. Participants were recruited through purposive sampling via professional poultry organizations, including the Netherlands Agricultural and

Horticultural Association (LTO), a nationwide occupational health service (STIGAS), and via an announcement posted on the website of the Dutch poultry farmers' association (pluimveeweb). Recruitment messages were distributed through their websites, newsletters and several professional WhatsApp groups. The participants received a gift voucher upon completion of the interview.

Theoretical framework

An interview guide was developed on the basis of the attitude–social influence–self-efficacy (ASE) model, which is derived from the theory of planned behavior and social learning theory.⁹ The ASE model states that the intention for behaviour, which is predictive of actual behaviour, is shaped by three determinants: attitude, social influence and self-efficacy, alongside perceived motivations and barriers (Figure 1). The interview guide was reviewed by experts and piloted once, leading to minor refinements. The pilot interview is not included in the results of the study.

Data collection

The participants registered via email, received additional information about the study by email, and were given the opportunity to ask questions before providing written informed consent. The interviews were conducted online (Microsoft Teams) by two female researchers (both working at the MPHS). The interviewers were a public health nurse with some interview experience (Msc) (EW) and an epidemiologist (Msc) (EB). The interviewers acknowledged potential personal biases and assumptions linked to their roles within the public health service and took measures to ensure that these did not affect the data collection. No prior relationship was established before the study commenced; contact was limited to informing participants about the study and coordinating the interview. At the beginning of each interview, a few background questions were asked (age, sex, place of residence, educational level, profession, past experience with avian influenza outbreaks on their poultry farm, philosophy of life). The interviews lasted between 25 and 55 minutes (average 40 minutes). All the interviews were video-recorded and transcribed verbatim. No participants refused to participate or dropped out of the study.

Data analysis

Thematic analysis was performed via a content analysis approach. Three researchers (EW, EB, and KW) were involved in coding, and the CDC Excel tool was used for thematic analysis. The first three interviews were independently coded by the two interviewers (EW, EB). Their coding was then compared and discussed with a third researcher (who had not conducted any interviews). The remaining interviews were coded by one of the two interviewing researchers (EW, EB), with any uncertainties resolved through joint discussion. Thematic saturation was assessed collaboratively by all three researchers after the eighth and twelfth interviews, when no new insights into perceptions, motivations, or barriers to the influenza vaccine had emerged. During the preparation of this work, the authors used Microsoft Copilot to translate the text and improve the grammar. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Ethical approval

Ethical approval was obtained from CMO Oost-Nederland (2026-18894). The study adhered to the

Declaration of Helsinki. All participants provided informed consent.

Results

Sample demographics

Twelve poultry farmers (7 men, 5 women; aged 32-65 years) from eight out of 12 Dutch provinces participated. Table 2 shows the demographic characteristics of the participants. Eleven participants owned a poultry farm and had daily contact with poultry at their farm. One participant visited poultry farms monthly at the time of the interview but had daily contact with poultry in the past. One poultry farmer also had a part-time job in healthcare. Half had experienced an outbreak of avian influenza with culling poultry on their farm or had to deal with a nearby outbreak that led to preventive culling on their farm.

[Table 1: Demographic characteristics of the participants]

	Participants (n=12)
Sex	
Male	7
Female	5
Age (years)	
30-39	1
40-49	3
50-59	6
60-69	2
Province (region)	
Groningen (North)	1
Friesland (North)	2
Drenthe (North)	2
Overijssel (East)	1
Gelderland (East)	2
Flevoland (East)	1
Noord-Brabant (South)	1
Noord-Holland (West)	1
Level of Education	
MBO (Intermediate)	3
HBO (Higher professional)	7
WO bachelor/master (Academic)	2
Philosophy of life	
No specific	9
Protestantism	3
Experienced avian influenza outbreak on their poultry farm	
Yes culling of poultry	3
Yes preventive culling of poultry	3
No	6

Poultry farmers' attitudes towards vaccination in general

All participants had been vaccinated against different infectious diseases in the past. Several participants had a positive attitude towards vaccination in general; they thought about it as a normal thing to do, and they trusted vaccinations in general. Some participants reported that they only trusted vaccines that had been available for a longer time, such as those widely used in the Dutch National Immunization Program. In contrast, they expressed less trust in newer vaccines, such as mRNA vaccines, and in vaccines that are updated annually, such as the influenza vaccine.

The participants' attitudes towards vaccination changed with negative experiences after vaccination, for example, when they experienced side effects. Several participants stated that they had a more negative attitude toward vaccination since the COVID-19 pandemic. They also experienced this in their social environment.

"There is simply much more now, I notice in practice, that people are more alert: do I truly want all this, do I want all these vaccinations? And I notice it among colleagues as well. So, COVID has not really benefited the adherence to vaccination." [P5, also working in healthcare]

Attitude toward influenza vaccination

The participants had different thoughts about annual seasonal influenza vaccination as a preventive measure because of their risk of being infected with both avian and human influenza. Approximately half of the participants thought positively about it. They thought that it was a reasonable measure. Others expressed scepticism about government intentions and doubted whether the government was wanting the best for them. Regardless of their attitudes, the participants stated that vaccinations must be offered voluntarily.

"That's just how farmers are: if something absolutely has to be done, then they won't do it. Yes, it sounds a bit strange, but that's just how farmers are; they can be a bit recalcitrant, especially when something is imposed by the government. Then you will definitely get resistance." [P6]

There was no difference in participants' vaccination intentions based on whether they experienced an outbreak of avian influenza with the culling of poultry on their farm. Some participants wondered if poultry farmers were the only risk group that qualified for influenza vaccination. For them it felt like, poultry farmers were considered as the group at highest risk. They found it important that vaccination be offered to other risk groups who frequently come into contact with birds.

"In other words, it's not just for us, but then it is important for many more people. It's not only for poultry farmers and not only for those who work with poultry, but then I think you also end up with animal ambulance staff, veterinarians, you name it, that's where you'll end up too. People from the NVWA [Netherlands Food and Consumer Product Safety Authority] who visit farms – you name it." [P1]

Motivations for influenza vaccination

The primary motivator for receiving annual seasonal influenza vaccination was reducing the risk of reassortment of human and avian influenza viruses and thereby preventing a future pandemic.

"The most important thing is that I don't want to burden society with a new epidemic." [P2]

Several participants thought positively about annual influenza vaccination, and they also viewed vaccination as contributing positively to the public image of the poultry sector.

"One reason is to show citizens: look, as in the poultry sector, we truly do everything we can to prevent an avian influenza virus from jumping from our animals, in any case, to a human variant." [P1]

Furthermore, some participants mentioned protection of personal or family health as a motivation for vaccination. Additionally, influenza vaccination was mentioned as an easily accessible measure and was perceived as a reliable vaccination.

Barriers to influenza vaccination

Several participants perceived the risk of reassortment of viruses to be very small. Because of this, they wondered if the benefits of vaccinations outweigh the disadvantages, such as side effects. Several participants stated that they were not willing to receive influenza vaccination for this reason.

"When you look specifically at avian influenza, I find the benefit minimal, so to speak. I mean, there is a chance that you as a poultry farmer—a small chance—could get the avian influenza virus. Then you would also have to happen to have the human influenza virus, and that chance is already small. And then there is also a very small chance that they would fuse together, and yet another very small chance that a dangerous variant would emerge, so to speak. If you add up all those very small chances, I'd rather buy a lottery ticket — I'd have a better chance of winning the state lottery, let's say, than the chance that something will happen here. So yes, in my view, the benefit is so minimal that I don't see any meaningful necessity for it." [P10]

Another barrier to vaccine uptake, as mentioned previously, was their lack of trust in the government. However, feelings of rules being imposed by the government, the poultry sector being the victim and a negative image of the poultry sector, were also mentioned by participants.

"With all the laws and regulations that have been poured on us over the past few years, you know, you end up getting a story, being the scapegoat again, you know? [p1]"

Furthermore, some participants were unwilling to receive an influenza vaccination because they thought that an influenza infection was not a threat to their own health.

Risk perception

Most participants perceived the risk of viral reassortment in the Netherlands as very low. They perceived this risk higher abroad. The perceived risk to public health was greater than the risk to people's own health, which was perceived as low. The perceived risk increased when outbreaks occurred closer to

their farms or when new avian influenza variants emerged internationally. Most participants were aware of the possible severe consequences for public health in the case of reassortment.

“Yes, well, I did not think the chances were very high either. But yes, now you hear slightly different stories in the United States, so my view on it is starting to change a bit.”

[...]

“Well, that in the United States, mammals are also getting infected, that it mixes more with the human virus, and that at some point, it will become a pandemic again. [p8]”

One participant mentioned the absence of outbreaks as a reason for not receiving an influenza vaccination at that time. During the period of the interviews, no avian influenza outbreaks occurred at poultry farms in the Netherlands. Another participant, with a negative attitude towards influenza vaccination, also stated that his opinion could change in the case of more outbreaks of avian influenza nearby.

“No. I mean... if bird flu is all over the Netherlands again, then maybe. But otherwise, no. That also goes with ups and downs. When there is very little bird flu around, people also become less interested in obtaining a flu shot. Then there is less attention for it as well. Let me put it that way. [P4]”

Furthermore, participants did not perceive the highest risk in the poultry sector. They argued that the poultry sector already has stringent hygiene rules and monitoring. They felt that the risk outside of the poultry sector was greater, for example, in wild animals, because they felt that less attention was given there.

“That is also low. It is low, but I do believe it is very important that more attention is given to nature management. You can see it now with swans, geese, and so on. Farms are inspected thoroughly – the problem does not originate there – but the natural environment is largely overlooked. That is something I find somewhat frustrating at times.” [P5]

Social influence

Most participants indicated that vaccination uptake was their own choice, which was not influenced by others. However, several participants stated that they had discussed vaccination uptake with family members. Some would discuss the subject with colleague farmers, whereas others state that they would not due to the sensitive subject matter. The general practitioner, veterinarian and poultry adviser were regarded as trusted experts on this subject.

“You know what I mean. I specifically chose her [the veterinarian] because I truly see her as a good partner in all this. So I would definitely take her advice about the flu shot seriously. That doesn’t mean I’d follow it one-to-one, but I’d definitely do something with her advice.” [P12]

Information needs

Participants had diverse information needs regarding vaccination uptake decisions. While some

participants stated that they already had sufficient information, others expressed a need of more detailed information about various topics, including vaccination recommendations, potential risks, which groups qualify for vaccination, vaccine effectiveness, and advantages and disadvantages of vaccination.

Several participants stated that information should be provided by trusted parties, such as professional interest groups or other organizations within the agricultural sector. For example, the national animal health service was seen as a trusted party to provide information. Additionally, collaboration between human and veterinary health services was named in this context. Some participants found it important to know the exact source of information to be able to decide whether they could trust it or not. Various types of information materials, such as letters, newsletters and brochures, were mentioned. Some participants considered personal letters to be the most trustworthy. Additionally, the need for clear and easy-to-understand information materials for their employees was noted.

Practical implementation

The participants emphasized that receiving the influenza vaccination should be made as easy as possible. Vaccination should be given on or nearby the farm, for example, by the general practitioner. Additionally, veterinarians were mentioned because they already visit the farms regularly. Vaccination timing should also be flexible because of periods with high workload on poultry farms.

“Yes, you also hope to receive the vaccination at the most suitable moment, so to speak. And if you know that your immune system will be a little weaker for a week afterwards, well, you may need to be careful not to plan it during a very busy week. You see, we always have peaks and troughs in terms of workload at our company. Yes. I can imagine we wouldn’t do that if I knew I would be working 20-hour days for five days afterwards, so to speak. Those are the wrong moments.” [P2]

One participant declared that vaccination should be offered for free.

“On the one hand, it’s just, get the shot and you’re done. Maybe the veterinarian could even do it – they come by anyway. Once a year. Then, it is arranged. Then, you also don’t have to drive extra. That might actually be a good idea.” [P3]

Discussion

Increasing avian influenza A (H5N1) outbreaks in Europe and the Americas, along with repeated antibody detection in mammals,¹⁰ have heightened concerns about zoonotic transmission. Therefore, annual influenza vaccination is recommended for risk groups, including poultry farmers. Our findings suggest that poultry farmers’ vaccination decisions are shaped by a combination of societal responsibility, perceived risk, trust in the government, and practical considerations.

Attitudes towards vaccination in general varied substantially among participants and appeared to mirror those observed in the general population, likely reflecting the lasting influence of the COVID-19 pandemic.¹¹⁻¹³ However, attitudes towards seasonal influenza vaccination in the context of avian

influenza are also shaped by factors specific to poultry farmers. Participants identified potential benefits including contributing to the poultry sector's image, but also raised concerns related to the frequent imposition of government regulations. These findings suggest that vaccination strategies for poultry farmers should take into account both broader societal attitudes towards vaccination and the specific occupational poultry context in which vaccination decisions are made.

The primary motivator of participants to consider vaccination was to reduce the risk of viral reassortment, prevent a future pandemic, and contribute to a positive image of the sector, reflecting a broader sense of responsibility. Similar to findings among healthcare professionals,¹⁴ vaccination acceptance among poultry farmers appears to be partly driven by prosocial motivations, whereby vaccination is perceived as a means of protecting others and contributing to public health, even when personal risk is considered low. Such behaviour can be understood within established behavioural frameworks, including the ASE model and the 5C model. These models explain that the decision to vaccinate is not solely based on individual health but is shaped by social norms⁹ and considerations such as the willingness to protect others with vaccination.¹⁵

Despite these strong prosocial motivations, important barriers to vaccination uptake remain. One important barrier identified in this study was a low perceived personal risk. Participants generally considered their personal risk from avian influenza to be very low, whereas the risk to public health and the potential consequences of avian-human influenza virus reassortment were perceived as greater. This aligns with previous research, which found that the perceived severity of avian influenza was high, but participants did not consider themselves vulnerable to it.^{7,16} Furthermore, participants did not perceive the highest risk to lie within the poultry sector itself. They noted the presence of stringent hygiene measures and surveillance systems. Instead, they considered the risk to be greater outside the sector, particularly in wild animal populations where control is more limited. Effective risk communication should therefore clearly address the risk and potential consequences of reassortment, enabling poultry farmers to make informed decisions.

Another important barrier identified in this study was limited trust in the government. Among poultry farmers, distrust appeared to be reinforced by experiences with agricultural regulations. Several participants perceived the influenza vaccine as another governmental obligation, which may contribute to resistance to the intervention. Such distrust has been documented across various countries, often in relation to regulatory pressures.^{17,18} In the general population, lower levels of trust in the government have been associated with reduced willingness to accept vaccination.¹⁹⁻²² Similar trust-related concerns have been reported following influenza vaccination campaigns among farmers in the UK and Finland, where vaccine uptake was suboptimal.^{8,23} In this context, trusted intermediaries may play an important role in facilitating vaccine acceptance. The participants identified general practitioners, veterinarians, poultry consultants, agricultural interest groups, and other sector-specific organizations as credible sources of information. They expressed a preference for receiving both vaccination and information

through these trusted parties. These findings suggest that a multisectoral approach engaging these intermediaries in both communication and implementation could improve vaccination uptake.

In addition to trust, practical considerations were identified as important determinants of vaccine uptake. Participants emphasized that vaccination should be free of charge, nearby and flexible in timing, particularly given periods of high workload associated with poultry farming. Similar logistical barriers, including time constraints and accessibility challenges, have been described in occupational vaccination programs among farmers in the UK and Finland.^{8,23} These findings highlight the importance of designing vaccination programs that are tailored to these practical needs of the target population.

To our knowledge, this is the first qualitative study in Europe to explore the attitudes of poultry farmers towards seasonal influenza vaccination due to the risk of avian influenza. The results of this study provide new insights and relevant information to improve vaccine uptake and vaccination strategies. Recruitment of participants through professional interest groups ensured that a sufficient number of participants could be enrolled within a relatively short period of time, demonstrating the perceived credibility of these organizations within the sector.

Several limitations should be considered. Although interviews were conducted until thematic saturation was reached, the sample size was relatively small (n=12). We may have missed poultry farmers who are not affiliated with professional interest groups, and no employees were included in the sample, which may limit the diversity of the perspectives captured. However, we interviewed a diverse range of participants representing both men and women, different age groups, different residential settings, and various types of poultry farms. Employees were sometimes mentioned, for example, their need for straightforward information. Another limitation was that the participants received a brief explanation of the risk of viral reassortment prior to the interviews. Although necessary to ensure a common understanding of the topic, this information may have influenced participants' responses and increased the perceived relevance of vaccination. Furthermore, annual vaccination against seasonal influenza because of the risk of avian influenza was a hypothetical scenario that many participants had not previously considered. During the interviews, some participants indicated that their opinions might change depending on the situation at that moment.

The findings of this study have implications beyond the Dutch context. Many European countries recommend seasonal influenza vaccination for individuals exposed to animal influenza viruses.^{24,25} The determinants identified in this study, such as societal responsibility, distrust in the government, and perceived regulatory burden, are likely relevant across countries with similar agricultural systems. Moreover, these insights may extend to other livestock sectors, such as swine farming, where similar risks of viral reassortment exist²⁶ and where farmers operate within comparable regulatory environments. However, the generalizability of these findings cannot be assured in national policy environments with other trust dynamics. Further research in diverse settings is therefore recommended.

Conclusion and recommendations

In conclusion, this study demonstrates that influenza vaccination acceptance among poultry farmers is influenced by a complex interplay of societal responsibility, perceived risk, governmental trust, and practical considerations. Key motivators include the prevention of viral reassortment and pandemic risk, as well as contributing to a positive sector image, whereas low perceived personal risk and distrust toward the government act as barriers to vaccination.

Effective vaccination strategies should therefore highlight the societal benefits of vaccination and the potentially severe public health consequences of a novel influenza virus. To enhance uptake, communication and implementation should involve trusted intermediaries, such as veterinarians, general practitioners, poultry advisers and sector organizations. In addition, vaccination programs should be easily accessible, flexible in timing and free of charge.

These findings highlight the importance of designing vaccination programs that are tailored to the specific occupational context in which poultry farmers make vaccination decisions. Qualitative research can provide valuable insights into the practical needs, perceptions, and contextual factors that influence these decisions, supporting the development of vaccination programs that are responsive to the specific needs and working conditions of poultry farmers.

Abbreviations

ASE model

Attitude–Social influence–Self-Efficacy model

CDC Excel tool

Center for Disease Control and Prevention Excel tool for thematic analysis

LTO

Agriculture and Horticulture Organization

METC

Medical Ethics Committee

MPHS

Municipal Public Health Service

mRNA

Messenger RNA

NVWA

Netherlands Food and Consumer Product Safety Authority

STIGAS

Foundation for Joint Occupational Health Services

WHO

World Health Organization

Declarations

Ethics approval and consent to participate: This study was conducted in compliance with the Declaration of Helsinki. The Medical Ethics Committee (METC Oost-Nederland) of the Arnhem-Nijmegen region assessed the study and concluded that it was exempt from their approval (project number 2026-18894). All the participants received detailed information about the study via email and provided written informed consent before the interviews.

Consent for publication: Not applicable; the manuscript does not contain any individually identifiable personal data.

Data availability: The data used in the study are not publicly available due to ethical and privacy restrictions. The data will be shared upon reasonable request to the corresponding author.

Competing interests: The author(s) declare(s) that they have no competing interests.

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Author contributions:

Conceptualize the study, collect the data, conduct the initial analyses, and draft the manuscript EvdB, EW. EvdB and EW contributed equally to this work and share first authorship.

Contributed to the development of the interview guide, supported the study design, provided methodological guidance, and critically revised the manuscript TvL.

Provided methodological guidance, contributed to data interpretation, supervised the project, and reviewed the final manuscript KW.

All the authors read and approved the final version.

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Figures

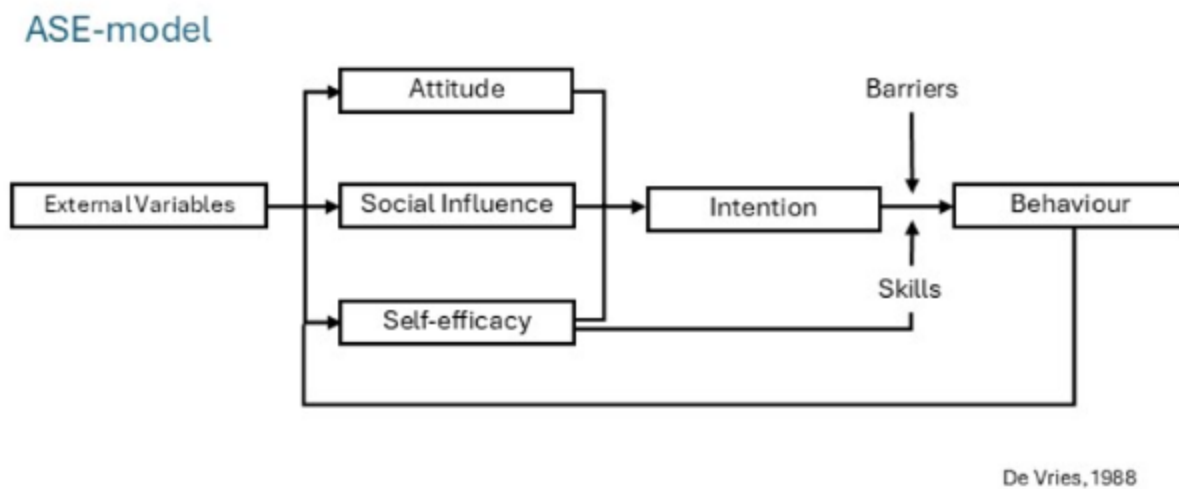


Figure 1

Author's representation of the ASE model (De Vries et al., 1988)