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"Attitude, knowledge and behavior towards food safety among families with children under five years in Austria and Sweden."

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Abstract

Studies repeatedly show deficits in the proper handling of food in the home environment. Raw animal products are the main source of many pathogens such as *Campylobacter, Salmonella* and *EHEC*.

The purpose of this work is to investigate the current attitudes, knowledge, and behaviors of families with children under the age of five. The food groups studied were raw ground beef, raw chicken, and raw eggs. A comparison between Austria and Sweden will help to identify and understand the effectiveness of specific governmental strategies as well as personal motivators for proper food handling at home.

An online questionnaire was used to collect data. The link was distributed via social media, stakeholders and in person. A total of 67 people from Austria and 65 from Sweden participated in the survey. The average age of the study population was 35 years, and the majority consisted of women.
The data showed a lack of hygiene and knowledge. The knowledge about the correct refrigerator temperature was particularly poor. The use of a thermometer in the preparation of animal foods was not important. The greatest difference between countries was found for eggs.

The results show that government incentives have a significant impact on risk perception in the population. Sweden has strict guidelines for chicken farming and showed significantly lower risk awareness than Austria.

Despite national strategies, the biggest influencing factor on current behavior is past behavior. Knowledge showed no significant influence on behavior, but attitude and habits had a significant influence.

Kurzfassung

Studien zeigen immer wieder Defizite im richtigen Umgang mit Lebensmitteln im häuslichen Umfeld. Rohe tierische Produkte sind die Hauptquelle für viele Krankheitserreger wie *Campylobacter*, *Salmonellen* und *EHEC*.

Das Ziel dieser Arbeit ist es, die aktuellen Einstellung, Wissen und Verhaltensweisen von Familien mit Kindern unter fünf Jahren zu untersuchen. Die untersuchten Lebensmittelgruppen waren rohes Rinderfaschiertes, rohes Hühnerfleisch und rohe Eier. Ein Vergleich zwischen Österreich und Schweden soll dazu beitragen, die Wirksamkeit spezifischer staatlicher Strategien und persönlicher Motivatoren für den richtigen Umgang mit Lebensmitteln zu Hause zu ermitteln und zu verstehen.

Zur Datenerhebung wurde ein Online-Fragebogen verwendet. Der Link wurde über soziale Medien, Interessengruppen und persönlich verteilt. Insgesamt nahmen 67 Personen aus Österreich und 65 aus Schweden an der Umfrage teil. Das Durchschnittsalter der Studienpopulation lag bei 35 Jahren, und die Mehrheit bestand aus Frauen. Die Daten zeigten einen Mangel an Hygiene und Wissen. Besonders schlecht war das Wissen über die richtige Kühlschranktemperatur. Die Verwendung eines Thermometers bei der Zubereitung von tierischen Lebensmitteln war nicht von großer Bedeutung. Der größte Unterschied zwischen den Ländern wurde bei Eiern festgestellt.

Die Ergebnisse zeigen, dass staatliche Programme einen erheblichen Einfluss auf die Risikowahrnehmung in der Bevölkerung haben. Schweden hat strenge Richtlinien für die Hühnerhaltung und zeigte ein deutlich geringeres Risikobewusstsein als Österreich.

Trotz nationaler Strategien ist der größte Einflussfaktor auf das aktuelle Verhalten das Verhalten in der Vergangenheit. Das Wissen zeigte keinen signifikanten Einfluss auf das Verhalten, aber die Einstellung und die Gewohnheiten hatten einen signifikanten Einfluss.

Table of content

List of figures

List of tables

List of abbreviations

AGES	Agentur für Gesundheit und Ernährungssicherheit
AMR	Antimicrobial resistance
aW	Water activity
CAC	Codex Alimentarius Commission
DAEC	Diffusely adherent Escherichia coli
E. Coli	Escherichia coli
EAEC	Enteroaggregative Escherichia coli
ECDC	European Centre for Disease Prevention and Control
EFSA	European Food Safety Authority
EHEC	Enterohemorrhagic Escherichia coli
EIEC	Enteroinvasive Escherichia coli
EPEC	Enteropathogenic Escherichia coli
ETEC	Enterotoxigenic Escherichia coli
FAO	Food and Agricultural Organization
GBS	Guillain-Barré Syndrome
HC	Hemorrhagic colitis
HUS	Haemolytic uraemic syndrome
IFH	International Scientific Forum on Home Hygiene
INFOSAN	International Food Safety Authorities Network
OECD	Organisation for Economic Co-operation and Development
OIE	World Organization for Animal Health
RASFF	Rapid Alert System for Food and Feed
STEC	Shiga toxin-producing Escherichia coli
Stx	Shiga toxin
VTEC	Verotoxin-producing Escherichia coli
WHO	World Health Organization

1. Introduction

Worldwide, 1 in 10 people become ill after eating contaminated food each year, resulting in over 420,000 deaths. Of these, 125,000 are children under the age of five. In the European Union, it is estimated that more than 23 million people develop a foodborne illness every year, resulting in about 5000 deaths. The actual number is believed to be much higher, due to underreporting (WHO, 2017; Aldrian *et al.*, 2011).

International studies repeatedly show deficiencies in food safety knowledge and behavior across the population (Osaili *et al.*, 2021; Marklinder *et al.*, 2020; Kennedy *et al.*, 2005; Lange *et al.*, 2017).
This work focuses in particular on food safety knowledge, behavior and attitude in Austria and Sweden. In both countries, multiple controls along the supply chain ensure excellent food safety in retail, catering, and other points of sale. Nevertheless, foodborne illnesses are a serious issue in both countries (Aldrian *et al.*, 2011; Lindqvist *et al.*, 2001).

Food can be contaminated at any point of production and distribution. However, studies show that a large part of foodborne disease incidents are caused by food that is improperly prepared or mishandled at home (WHO, 2020b). Many people are unaware of this potential risk, although experts agree that the main location for foodborne illness outbreaks occur at home (Aldrian *et al.*, 2011; Byrd-Bredbenner *et al.*, 2013). It is estimated that in the EU, 1 out of 3 foodborne outbreaks occurs in private households (EFSA, 2010; EFSA and ECDC, 2013; Byrd-Bredbenner et al., 2013).
Particularly at risk are young children, pregnant women, the elderly, and immunocompromised individuals (WHO, 2017). However, most of the foodborne illnesses are not fatal, but for vulnerable groups even a simple diarrhea can be dangerous and life- threatening (WHO, 2017). It has been reported that nearly one-third of foodborne deaths worldwide affect children under the age of five (WHO, 2020b).

The goal of this thesis is to examine current knowledge, behaviors, and attitudes of families to determine what factors influence positive behaviors. A comparison between

the countries should help to understand the effectiveness of specific strategies in the countries. Social factors will also be discussed.

2. Scientific background

2.1. Foodborne zoonotic diseases

2.1.1. Definition of foodborne zoonotic disease

Diseases caused by consumption of food or water contaminated with pathogenic bacteria, viruses, or parasites are called foodborne diseases or food poisoning (Adley and Ryan, 2016). When the disease is transmitted from animals to humans, it is called a zoonosis. To date, approximately 200 zoonotic diseases have been identified (WHO, 2020c).

The course of the disease can vary greatly and depends on factors such as the patient's age, nutritional and health status, and the number of germs ingested (EFSA, 2022; Adley & Ryan, 2016; WHO, 2017). Most zoonotic diseases improve within a few days and have a mild, self-limiting course with symptoms such as nausea, vomiting and diarrhea (WHO, 2017). However, in some cases, it can progress to a severe course that can lead to neurological disorders, kidney failure, liver failure, arthritis, cancer and can even lead to death (WHO, 2017; EFSA, 2022; Adley & Ryan, 2016; WHO, 2022).

2.1.2. Occurence of foodborne zoonotic disease

Food can be infected with pathogens throughout the entire food chain, from farm to slaughter, processing and preparation in industry and at home (AGES, 2022a; EFSA, 2010).

On farms, animals can become infected when they are fed contaminated feed. The pathogens are then found in the animals' intestines, with the animals often showing no signs of infection. However, they excrete the pathogens with their feces. In this way, pathogens can be transmitted to other animals, or if the contaminated feces are used as fertilizer, it can contaminate crops (EFSA, 2021). In 2005, an EHEC outbreak occurred in southwestern Sweden, affecting 135 people. The most likely source was

raw lettuce watered with contaminated irrigation water during production (Edelstein et al., 2014).

During processing meat can become contaminated by contact with the intestines where the pathogens live in. Employees can become infected as a result and spread it to the food or other employees. Since humans also excrete the pathogen via their feces, employees do not necessarily have to become infected during work but can also become infected outside of work. Therefore, proper hand washing after using the bathroom is of great importance to avoid contamination (EFSA, 2010).

A large proportion of infection occur at the household level (EFSA, 2010). Because infection is usually mild, unconfirmed, and therefore unreported, some experts estimate the number to be as high as 95%. Half or more of all Salmonella outbreaks can be traced to the household. However, although experts agree that the home is one of the main places where most foodborne illnesses occur, consumers do not consider it a risky place (Byrd-Bredbenner et al., 2013). A 2011 study concluded that only 8% of consumers thought the home was a place where foodborne illness could occur. Another study found that only 12% of Europeans who suffered a foodborne infection believed it was due to improper food handling at home (Byrd-Bredbenner et al., 2013).

2.1.3. Surveillance authorities and tools for food safety issues

Food safety authorities such as the AGES (Agentur für Gesundheit und Ernährungssicherheit) in Austria and Livsmedelsverket in Sweden monitor, evaluate, and conduct research to provide the population with safe food (AGES, 2022b; Livsmedelsverket, 2022). Due to globalization, food safety issues not only affect the country where the food originates, but also the exporting countries.

Laws and guidelines are important to reduce the incidence of future foodborne disease outbreaks. International and national authorities work closely together (AGES, 2022a; EFSA, 2022; Adley & Ryan, 2016; FAO and WHO, 2020). Some of the key authorities and the key laws and instruments to ensure safe food are listed below, starting at the global level.

2.1.3.1. WHO

At the global level, the World Health Organization ensures food safety along the entire food chain. It provides support to member states in the prevention, detection, and management of foodborne risks. They work closely together with the FAO (Food and Agriculture Organization) and the OIE (World Organization for Animal Health) to provide various guidelines, recommendations, and control systems to ensure safe food. Some of the most important inventions are the “Codex Alimentarius”, “INFOSAN”, and the “WHO Five Keys to Safer Food” (WHO, 2020b).

Codex Alimentarius:

It represents one of the most important guidelines and the basis for international food safety (WHO, 2020b). It is an international collection of food standards, guidelines, and recommendations to ensure the safety and fairness of global trade (Stankovic, 2016). This Codex has its origin in Austria. As early as 1891, the first ideas for a Codex were developed at an international meeting of food chemists and microscopists in Vienna. In the same year, Austria set up a scientific commission that drafted the first version of the so-called Codex Alimentarius Austriacus. Subsequently, the Austrian Hans Frenzel developed the Codex Alimentarius Europaeus, which was based on the Austrian Codex (Vojir, Schübl and Elmadfa, 2012).

In 1963, FAO and WHO established the CAC (Codex Alimentarius Comission) and shortly thereafter the Codex Alimentarius was created, based on the Codex Alimentarius Austriacus and Alimentarius Europaeus (Stankovic, 2016; Vojir et al., 2012). It should be noted that the Codex Alimentarius is not a law and therefore not legally binding. It is a collection of international food standards containing recommendations for its members (WHO, 2020b).

International Food Safety Authorities Network (INFOSAN)

INFOSAN is a global network of national food safety authorities. It allows its members to quickly exchange information when a food safety incident occurs. This prevents the spread of food that may pose a public health risk from one country to another (FAO & WHO, 2020).

2.1.3.2. EFSA

At the European level, EFSA (European Food Safety Authority) monitors all stages of food production and supply and works closely with the ECDC (European Centre for Disease Prevention and Control). Together, they monitor zoonoses and foodborne outbreaks (EFSA, 2022). Member states collect the data in their countries and forward it to the European Commission, which then forwards it to EFSA, which analyzes the data. Based on the data, EFSA publishes an annual report comparing data on zoonoses, zoonotic agents, antimicrobial resistance, foodborne outbreaks, and their sources in the EU. In Austria, the AGES and in Sweden, the SVA are responsible for reporting the data (Food and Authority, 2021)

RASFF:

The RASFF (Rapid Alert System for Food and Feed) was founded in 1979 and is the European equivalent of INFOSAN. With this tool, information can be exchanged very quickly between members. Thanks to RASFF many food safety risks had been noticed before they had a harm on consumers. In 2020, 43 notifications related to foodborne illness outbreaks were registered. *Salmonella*, *Norovirus*, and *Listeria monocytogenes* were identified as the most common pathogens reported (European Union, 2016).

2.1.4. Data and Burden

In 2020, 3086 foodborne outbreaks with 20,017 human cases were reported in the European Union. It caused 1675 hospitalizations and 34 deaths. Austria contributed with 21 and Sweden with 50 outbreaks (Food & Authority, 2021). To call it an “outbreak”, two or more people must experience a similar illness after consuming the same contaminated food or beverage. Similarly, if two or more people experience the same disease from contact with the same animal or the environment of an animal, this is called a zoonotic outbreak. Usually, an outbreak comprises no more than 100 cases and can be detected and eliminated quickly thanks to well-functioning surveillance systems (Center for Disease Control and Prevention, 2016).

Compared to 2019 data, there has been an overall decrease in reported foodborne illness at the European level, although it should be noted that the lower number may be influenced by the withdrawal of the United Kingdom and the COVID 19 pandemic, as the overall trend from 2016-2020 showed neither a static increase nor a decrease

(Food & Authority, 2021). Foodborne zoonotic diseases not only have an immense impact on human health, but also affect a country's reputation and negatively impact a country's economic development (WHO, 2017). For instance, the economic burden of *Campylobacter* is estimated to be around EUR 2.4 billion, and for Salmonella it is even higher with EUR 3 billion per year (EFSA, 2019; EFSA, 2014).

This paper focuses exclusively on *Campylobacter*, *Salmonella* and *E. Coli*. All three have in common that they show a seasonal pattern. Fewer cases are reported in the winter months than in the summer months (AGES, 2022b; Food & Authority, 2021; Simjee, 2007). As shown in Table 1 and 2, there was a decrease in *Salmonella* and *Campylobacter* cases from 2016 to 2022 in Austria and Sweden. Table 3 shows that there was an increase in *E. coli* in Austria, while there was a decrease in Sweden.
As shown in the same tables, there are some discrepancies between the data published by EFSA and the data from the authorities in Austria (AGES) and Sweden (SVA). Data for Sweden differs by only one case, and for STEC it is identical. In Austria, it is different for all three pathogens. This is because data for the annual report must be submitted by May 31 of each year and AGES data are updated regularly(Food and Authority, 2021). For example, the data reported by EFSA for Salmonella in 2020 was 817, while the data reported by AGES was 721 (as of January 28, 2021) (Food & Authority, 2021; AGES 2022b). For comparison purposes, only EFSA data are used in the following paper.

Table 1 Number of Campylobacter cases per 100,000 inhabitants in Austria and Sweden in the years 2016 and 2020

***Campylobacter* cases in**	**Austria**		**Sweden**	
Data from	**EFSA**	**AGES**	**EFSA**	**SVA**
2016	7,083	/	11,021	/
2020	5,406	5162	3,435	3434

(Food & Authority, 2021; Matt *et al.*, 2021; National Veterinary Institute, 2020)

Table 2 Number of Salmonella cases per 100,000 inhabitants in Austria and Sweden in the years 2016 and 2020

***Salmonella* cases in**	**Austria**		**Sweden**	
Data from	**EFSA**	**AGES**	**EFSA**	**SVA**
2016	1,415	/	2,247	/
2020	817	721	825	826

(Food & Authority, 2021; AGES, 2022c; National Veterinary Institute, 2020)

Table 3 Number of STEC cases per 100,000 inhabitants in Austria and Sweden in the years 2016 and 2020

***STEC* cases in**	**Austria**		**Sweden**	
Data from	**EFSA**	**AGES**	**EFSA**	**SVA**
2016	177	/	638	/
2020	288	304	491	491

(Food & Authority, 2021; AGES, 2020; National Veterinary Institute, 2020)

2.1.4.1. Campylobacter

Campylobacter has been the most commonly reported zoonotic disease in Europe since 2005. In 2020, over 300 outbreaks with more than 120,000 cases were reported. Estimates suggest that the actual number in Europe is around nine million (EFSA, 2019). Campylobacteriosis accounts for more than 60% of all reported zoonotic cases in the EU (Food & Authority, 2021). Of those outbreaks, 10 occurred in Austria, affecting 5 406 persons, and 3 occurred in Sweden, with 3435 cases (Food & Authority, 2021).

In most cases (98.5%), infections are acquired in the EU. An exception are the Nordic countries (Sweden, Finland, Norway, Denmark and Iceland), which reported the highest proportion of travel-related cases. The most likely countries for infection outside the EU were Thailand, India, Morocco and Indonesia. Cases were reported from all age groups, but the highest proportion was reported from the 0-4 years age group (Food & Authority, 2021).

2.1.4.1.1. History and classification of *Campylobacter*

Campylobacter is a gram-negative, non-spore-forming, spiral-shaped bacterium first identified as a cause of abortion in cattle and sheep in 1915 (AGES, 2022a; Gillespie, 1994). It is divided into two groups according to the presence of catalase.

Catalase-negative: This group occurs mainly in animals as pathogens and does not normally pose a threat to humans (Gillespie, 1994).

Catalase-positive: Some species of this strain are pathogenic and occur in both animals and humans. This group can be divided into non-thermophilic and thermophilic species.
C. fetus is an example of a non-thermophilic strain and is mainly found in animals. It is a cause of spontaneous abortions, especially in cattle and sheep. This species is rarely found in humans but may be responsible for some cases of diarrhea in humans (Gillespie, 1994).

Of greater importance to humas are the thermophilic species. Representatives are *C. jejuni,* which is predominantly found in poultry, and *C. coli,* which is mainly found in pigs (Gillespie, 1994; Silvan and Martinez-Rodriguez, 2018). Of these two, *C. jejuni* alone is responsible for 90% of campylobacteriosis cases in humans (AGES, 2022a).

2.1.4.1.2. Growth requirements of *Campylobacter*

The bacterium has quite strict growth characteristics. It is microaerophilic and therefore requires very little oxygen. The minimum growth temperature is 30°C. The best temperature for the species relevant to humans is between 40 and 42°C. Freezing does not kill the bacteria, but reproduction is suppressed (Silvan and Martinez-Rodriguez, 2018).
It is also acid sensitive and can be easily eliminated at low pH. People with low stomach acidity may therefore be at higher risk (Gillespie, 1994).

2.1.4.1.3. Clinical presentation of *Campylobacter*

The incubation period is about 2 to 5 days, but whether campylobacteriosis breaks out depends largely on the number of germs ingested.

The bacteria can cause enterocolitis with accompanying symptoms such as malaise, fatigue , headache, watery to bloody diarrhea, abdominal pain, and high fever (AGES, 2022a).

In some cases, the pathogen can cause sequelae such as hepatitis and pancreatitis. It can also attack joints and cause arthritis. If it enters the bloodstream, it can cause bacteremia and some cases may develop the Guillain-Barré syndrome (GBS) (WHO, 2020). The Guillain-Barré syndrome is a neurological disorder that can lead to respiratory and neurological dysfunction such as areflexia. *C. jejuni* has been reported to be a major trigger for GBD. Approximately 25-40% of GBS patients reported an infection with the pathogen 1-3 weeks before the onset of the disease. However, the development of GBS is generally rare, with only 1 in 1000 patients developing it after an infection (Nyati and Nyati, 2013). Deaths caused by *Campylobacter* are seldom and occur mainly in high-risk groups such as very young children, the elderly, or immunocompromised individuals (WHO, 2020).

2.1.4.1.4. Sources and transmission of *Campylobacter*

The bacterium is found in the intestine of animals such as poultry, pigs and cattle, but also in domestic animals such as cats and dogs (AGES, 2022a; EFSA, 2019; WHO, 2020a). The pathogen rarely causes infection in these animals (WHO, 2020a). Of all animals, *Campylobacter* is most prevalent in birds, such as chickens, therefore raw poultry poses the greatest risk to humans (EFSA, 2019; AGES, 2022a).

Most infections are acquired through consumption of raw or undercooked meat, unpasteurized milk, and contaminated water (Nyati & Nyati, 2013). In 20-30% of cases, infection occurs through consumption of undercooked chicken (EFSA, 2019).

According to the Zoonoses report 2020, the main sources of infection in the EU were broiler meat and raw milk (Food & Authority, 2021).

Infection from beef and pork is not as common because of different slaughtering methods. This meat is often matured and often has a dry surface that makes it difficult for the bacteria to survive (AGES, 2022a). Campylobacteriosis is essentially a zoonosis, and human-to-human infection is rare (Gillespie, 1994). Typical symptoms of campylobacteriosis are diarrhea, fever, and abdominal cramps (WHO, 2020a; EFSA, 2019). It is the most common bacterial cause of diarrhoea in developed countries and the most common cause of bacterial gastroenteritis worldwide (Silvan

and Martinez-Rodriguez, 2018; Nyati & Nyati, 2013). The disease can be caused by even a small number of the bacteria. For example, there are about 10,000 germs on one gram of poultry skin, and only 500 germs are sufficient to cause infection (AGES, 2022a).

2.1.4.1.5. Treatment of *Campylobacter* infections

In most cases, no special treatment is required, the disease is self-limiting, and sometimes it may even be asymptomatic. It usually does not last more than a week, and long-term effects are uncommon (AGES, 2022a; Gillespie, 1994). If water loss from diarrhea is high, rehydration and electrolyte replacement are important. Antibiotic treatment may be given if patients develop high fever or if they belong to a high-risk group (AGES, 2022a).

2.1.4.2. Salmonella

Salmonellosis is the second most reported zoonosis in the EU. In 2020, almost 700 outbreaks with over 52,000 confirmed cases were reported. Austria accounted for seven outbreaks and Sweden for two (Food and Authority, 2021). Sweden, Estonia and Finland were the only countries that showed a significant downward trend since 2016 (Food & Authority, 2021).

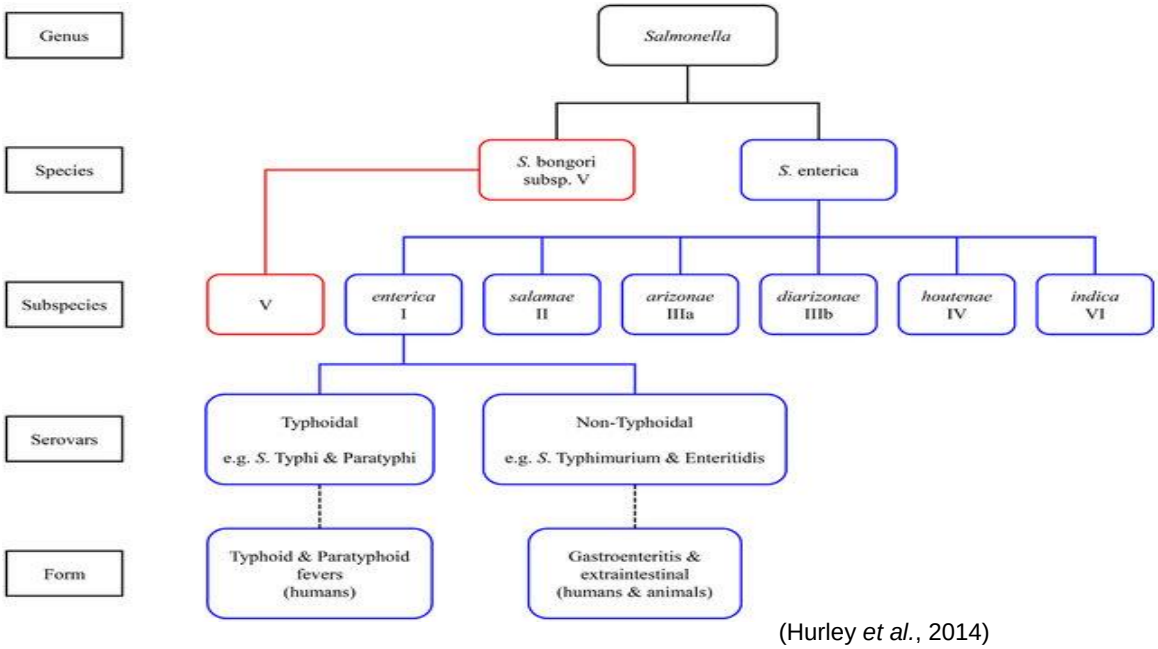
Salmonellosis is with 99,1% the most frequently reported cause of foodborne disease with the origin in the EU (EFSA, 2014). The remaining 0,9% are acquired through travel in the EU. Children under 10 and the elderly were the most affected (Food & Authority, 2021).

Although Austria has introduced vaccines for laying hens and broilers and increased animal testing, it has faced a persistent salmonellosis epidemic since 1989 (Kornschober, Mikula and Springer, 2009). Sweden, on the other hand, handles the *Salmonella* problem differently and more effectively. Almost all eggs and the meat are salmonella-free (EFSA, 2007). In general, the Nordic countries (Sweden, Norway and Finland) show a low prevalence of *Salmonella*. This is due to varies national control strategies (National Veterinary Institute, 2020). The reason for implementing a regulation was an outbreak in 1953 with more than 9000 cases and also some deaths

(FAO/WHO, 2002; Lundbeck, Plazikowski and Silverstolpe, 1955). The program aims to prevent *Salmonella* at every point of production. All feed for poultry and most feed for cattle and pigs must be heat treated. The feed manufacturer is responsible for producing *salmonella*-free feed. The Swedish Board of Agriculture monitors feed production and it is regulated in national legislation. The aim is that all animals sent for slaughter should be free of salmonella. If there is a clinical suspicion, an animal investigation is required. Actions must be taken to eliminate the infection. Unlike in Austria, vaccination is not carried out in Sweden. If the test for *Salmonella* in poultry is positive, the entire flock is euthanized. Thereafter, samples from the surrounding area must be negative before new birds are introduced (Axén et al., 2020).

2.1.4.2.1. History and Classification of *Salmonella*

Salmonella are gram-negative, facultative anaerobic, rod-shaped bacteria belonging to the Enterobacteriaceae family. They were first discovered in the intestines of pigs in 1855 by the American pathologist Dr. Daniel Elmer Salmon, from whom the name is derived. As shown in Figure 1 *Salmonella* is divided into two species: *Salmonella enterica* and *Salmonella bongori*. *S. enterica* can be divided into the following six subspecies, designated by Roman numerals: *I enterica, II salamae, IIIa arizonae, IIIb diarizonae, IV houtenae* and *VI indica.* The subspecies can be further subdivided into serovars, a synonymous word for serotype (Eng et al. 2015).



(Hurley *et al.*, 2014)

Figure 1 Classification of Salmonella species

Currently, more than 2400 serotypes have been identified. More than 50% belong to *S. enterica,* which is also the one of greatest concern in terms of food safety. It is responsible for 99% of *Salmonella* infections in humans and warm-blooded animals (Eng et al. 2015; Bell and Kyriakides, 2007). In the EU, most (57.9%) of reported *Salmonella* outbreaks are caused by this strain (Food and Authority 2021). *S. enterica* is divided into typhoid and non-typhoid serovars.

Typhoidal:

This serotype includes *Salmonella Typhi* and *Paratyphi* and is only found in humans and not in animals. The transmission occurs via the fecal-oral route (Eng et al. 2015). Contaminated sewage is a source of spread. The use of untreated sewage as plant fertilizer can contaminate food and water (WHO, 2018c).

Non-typhoidal:

According to WHO, the non-typhoidal form is one main cause of diarrheal diseases worldwide (WHO 2018a). To cause the disease a relatively large number of bacteria (more than 100,000) must be ingested, but this number can be easily reached if food is not stored properly (AGES 2022). The two most common strains for non-typhoidal *Salmonella* are *S. Typhimurium* and *S. Enteriditis*. Unlike the typhoid serotypes, these can occur in both humans and animals (Eng et al. 2015; WHO 2018a).

2.1.4.2.2. Growth requirements of *Salmonella*

Salmonella is ubiquitous and can survive in a wide variety of foods and environments (Bell and Kyriakides 2007). For optimal growth, it requires a temperature between 8°C and 45°C, a pH between 4 and 9, and a water activity greater than 0.94 (Silva and Gibbs 2012).

In a dry environment, it can survive for several weeks, while in water it can survive for several months (WHO, 2018b). Freezing or chilling does not kill the bacteria (AGES 2022).

2.1.4.2.3. Clinical presentation of *Salmonella*

Almost all strains of Salmonella are pathogenic, but the severity of disease depends greatly on the serotype and the health status of the human host (Eng et al. 2015). The clinical presentation differs between the typhoid and non-typhoid species.

Typhoidal:

S. typhi causes typhoid fever and *S. paratyphi* causes paratyphoid fever, both are grouped under the term “enteric fever”. Although the outcome of both is clinically indistinguishable, *S. typhi* is more often the causative agent (WHO 2018b). The range of onset of first symptoms is between 3-60 days after exposure, but in most cases after 7-14 days. Paratyphoid fever has a shorter incubation period of about 4-5 days (Basnyat *et al.*, 2021). The symptoms are often nonspecific and include headache, abdominal pain, cough, malaise, diarrhea, or constipation. One indicator is that the subsequent fever follows a specific pattern. It begins with an initial low fever (>37.5°C to 38.2°C) that slowly increases to high fever (>38.2°C to 41.5°C) in the second week (Eng et al. 2015; Basnyat et al. 2021). If enteric fever is untreated, the fever can persist for a month or even longer (Basnyat et al. 2021). In 10-20% of cases the disease is fatal, but with appropriate treatment, only 1-4% of cases are fatal (WHO 2018b). It can be difficult to recognize enteric fever because it can easily be confused with other febrile illnesses (WHO 2018b). Some other indicators that may accompany enteric fever and aid in recognition are myalgia, bradycardia, hepatomegaly, splenomegaly, and pink spots on the chest and abdomen (Eng et al. 2015).

In 30-50% of cases in young children, symptoms are accompanied by hepatitis and hepatomegaly. Typhoid salmonella is a serious health problem especially in developing countries such as South/Southeast Asia, Sub-Saharan Africa, and Oceania (WHO 2018b).

Caution should be taken when traveling to these countries. Enteric fever is the most common bacterial cause of fever in returning travelers. As mentioned earlier, diagnosis is often difficult and symptoms overlap with other causes of fever, therefore prevention is the best approach (Basnyat et al. 2021). There are three approved vaccines against typhoid fever on the market. However the vaccine is only for enteric fever caused by *S.Typhi* and not against *S. Paratyphi*. The WHO strongly recommends a vaccination when traveling to these countries, accompanied by general good hygiene practice such as hand washing, use of bottled water, avoidance of raw foods, ice and street food (WHO, 2018c).

Non-typhoidal:

The course of the disease is often mild or asymptomatic, depending on the number of ingested germs and the immune status of the affected person (AGES 2022). First symptoms usually occur between 6-72 hours after ingestion and last about 2-7 days (WHO 2018a). As with the typhoid form, it can be difficult to identify and associate these symptoms with *Salmonella*, as other bacterial pathogens can also cause similar symptoms. However, as mentioned above, a very typical indicator is the acute onset of the typical fever pattern accompanied by diarrhea and cramps. Unlike the typhoid form, the non-typhoid form does not result in the formation of pink spots (Hohmann, 2001). In about 5% of patients, gastroenteritis can progress to bacteremia. This is a serious and potentially fatal problem in which the bacteria enter the bloodstream. Subsequently, focal infections can occur, which include meningitis, septic arthritis, osteomyelitis, cholangitis, and pneumonia (Hohmann 2001).

2.1.4.2.4. Sources and transmission of *Salmonella*

The pathogen is mainly found in the intestines of mammals and birds, which do not even have to show symptoms but can simply carry and transmit it. Domestic animals such as cats, dogs and reptiles can also transmit it (EFSA, 2014; WHO 2018a).
Salmonella is found primarily in foods of animal origin like eggs, poultry and meat such as beef or pork. However, eggs and pork are shown to be less likely infected than poultry (EFSA, 2014). The pathogen is mainly transmitted through consumption of these foods when eaten raw or undercooked (EFSA, 2014; Food and Authority 2021).

But it can be also transmitted through fruits and vegetables if they have previously been contaminated with manure and not washed properly. Processed foods can also contain it. For example, a 2008 outbreak in the United States and Canada with 700 cases and nine deaths was attributed to peanut butter infected with *S. Typhimurium* (Food and Authority 2021; Centers for Disease Control and Prevention, 2008). Even small amounts of these bacteria in food can cause infection, with symptoms such as diarrhea, fever, and abdominal pain (Eng et al. 2015; EFSA, 2014). If it enters the blood stream, it can even be life-threatening. In 2020, the main causative agent of outbreaks in the EU was due to the *S. Enteritidis* serotype and the main associated foods sources were "eggs and egg products", "pork and derived products" and "bakery products" (Food & Authority, 2021).

2.1.4.2.5. Treatment of Salmonella infections

Especially in the non-typhoidal form, often no specific treatment is needed, and symptoms are usually mild as well. However, in cases where a lot of water is lost, through vomiting or diarrhea, rehydration and replacement of electrolytes such as sodium, potassium, and chloride ions are important (WHO, 2018b; Eng *et al.*, 2015).

If the illness is severe and/or occurs in a high-risk group (children, elderly, immunocompromised patients), they may be treated with antimicrobials. However, if the course is mild or moderate in overall healthy individuals, this is not recommended (Eng et al. 2015). The use of antimicrobials is controversial, and it is generally recommended that they be used as little as possible because antimicrobial resistance (AMR) is increasing worldwide. According to WHO, AMR is one of the top ten global health threats in the world. Antibiotics, antivirals, antifungals, and antiparasitic are all antimicrobial agents. They are used to prevent and treat infections in humans, animals and plants. Their misuse and overuse are the main factor in the development of resistant pathogens. The bacteria, viruses, fungi and parasites adapt over time and no longer respond to treatment. Thus, antibiotics and other antimicrobials become ineffective, resulting in infections that are more difficult or even impossible to treat (WHO 2021). Resistance is primarily promoted by the use of antibiotics in animal feed to promote growth and treat infections in animals (Eng et al. 2015). Some strains of *Salmonella*, particularly of the *S. Thyphi* type, have developed resistance to antimicrobials (Eng et al. 2015).

2.1.4.3. E. Coli (STEC)

STEC (Shiga toxin-producing Eschericia coli) is the fourth most reported foodborne illness in the EU (Food & Authority, 2021). In 2020, 34 outbreaks with more than 4400 confirmed cases were reported (Food and Authority, 2021).

The majority of infections occur within the EU. In 2020, about two-third of reported cases appeared in the home country or while traveling in the EU. Presumably due to the pandemic, the cases infected through travel outside the EU was much lower in 2020 than in 2019. The highest number of travel- associated cases was reported in Sweden, Finland, Germany and the Netherlands. Non-European countries associated with infection were Egypt, Thailand, and Turkey (Food & Authority, 2021).

2.1.4.3.1. History and classification of *E.Coli*

Escherichia coli (E. coli) are gram-negative, facultative anaerobic, rod-shaped bacteria that belong to the Enterobacteriaceae family. First identified in the feces of healthy people in 1855 by the German physician Theodor Escherich, from whom the bacteria got the name. Most strains are beneficial and do not harm the host, they are part of the production of vitamin K and B12 and are important for mammals. Other strains are harmful (Conrad *et al.*, 2016; Blount, 2015)**.**

The pathogenic *E. Coli* strains can be classified into the following six groups:

- *Enteropathogenic E. Coli (EPEC)*
- *Enterotoxigenic E. Coli (ETEC)*
- *Enteroaggregative E. Coli (EAEC)*
- *Enteroinvasive E. Coli (EIEC)*
- *Diffusely adherent E. Coli (DAEC*)
- *Enterohaemorrhagic E. Coli (EHEC)* (Conrad *et al.*, 2016)

Probably the best known is the last mentioned “EHEC”. All EHEC strains produce Shiga toxins. The E.Coli O157:H7 serotype is the most common one and the leading cause of EHEC infections in industrialized countries (Conrad et al., 2016; Batt, 2014). It was first discovered after an outbreak associated with the consumption of undercooked ground beef in 1982. The term “Shiga” arises from studies that showed that this strain had a deleterious effect on vero cells (a type of kidney cells isolated from monkeys). Further investigations showed a similarity to a toxin produced by the pathogen *Shigella.* Hence, it was given the prefix “Shiga”. The terms *Verotoxin-producing E. coli (VTEC*) and *Shiga toxin-producing E. coli (STEC)* are often used interchangeably (Batt, 2014). This paper will focus on *STEC* only.

2.1.4.3.2. Growth requirements of *E.Coli*

It is a facultative anaerobic organism that does not require oxygen for growth. The temperature range in which it can grow is from 7 °C to 50 °C. However, it grows best under aerobic conditions between 35-37°C (WHO, 2018a; Batt, 2014).

It can also grow in foods with a water activity (aW) of 0.95 and in acidic foods up to a pH of 4.4 (WHO, 2018; Batt, 2014). Freezing and refrigeration does not kill the

pathogen. However, it is heat sensitive and is eliminated by temperatures over 70 °C (Strawn and Danyluk, 2010; WHO, 2018a).

2.1.4.3.3. Clinical presentation of *E.Coli*

After consuming contaminated food, it can take up to 8 days for symptoms to appear, but the average incubation period is 3-4 days (WHO, 2018a). The most common sign of infection is watery diarrhea that may progress to bloody diarrhea. Other symptoms include abdominal cramps, nausea, headache, vomiting, and fever. The disease usually lasts no longer than 10 days (WHO, 2018a; Hunt, 2010; Simjee, 2007).

The infection may be asymptomatic in some people, but in some cases, it may develop into HC (hemorrhagic colitis) and/or HUS (hemolytic uremic syndrome). HC is characterized by diarrhea (often bloody) and is often accompanied by fever and crampy abdominal pain. The disease resolves after approximately 7 days (Hunt, 2010; WHO, 2018a). HUS occurs when blood vessels in the kidneys get damaged, leading to the formation of clots in the vessels. These clog the filtration system in the kidney and lead to kidney failure, anaemia, skin hemorrhages and neurological changes. It can be life-threatening, especially for children (Hunt, 2010; WHO, 2018a; AGES, 2020). Approximately 75% of HUS cases occur in children under 5 years of age, and it is the most common cause of acute renal failure in young children (Simjee, 2007; Hunt, 2010).

2.1.4.3.4. Sources and transmission of *E.Coli*

The bacteria is found primarily in the intestine of ruminants such as cattle, sheep and goats, but is also found in swine and poultry (Conrad et al., 2016; Simjee, 2007). These animals are often asymptomatic carriers (Conrad et al., 2016).

According to the Zoonoses Report 2020, the main sources of infection in the EU were tap water, meat and meat products, dairy products, and cheese (especially from cow's milk) (Food & Authority, 2021). In general, the main food sources associated with an EHEC infection are raw or undercooked ground meat products and raw milk (WHO, 2018a). Whole pieces of meat are not dangerous, the core of the meat is often even sterile. Contamination occurs during mincing when bacteria from the surface are mixed

into the whole piece. Therefore, undercooked burger patties and meatballs are very risky because the bacteria remain alive inside (WHO, 2006).

An infection can occur with less than 100 cells of *STEC* and is easily transmitted through animal and human feces (Simjee, 2007). When contaminated feces is used as manure, it can contaminate crops. Fruits and vegetables can also become contaminated by the use of contaminated irrigation water (Conrad et al., 2016). In particular, eating raw fruits and vegetables, sprouts and drinking unpasteurized, freshly squeezed juices can pose a risk of infection (Conrad et al., 2016; Simjee, 2007; AGES, 2020). For example, in 2005, an *EHEC* outbreak occurred in southwestern Sweden, affecting 135 people. The most likely source was raw lettuce watered with contaminated irrigation water during production (Edelstein *et al.*, 2014).
Humans infected with *EHEC* can excrete the pathogen in their feces for several weeks. One study showed that patients with HC and HUS carried the bacteria in their feces for up to 21 days (Simjee, 2007).

2.1.4.3.5. Treatment of *E.Coli infections*

In most cases, no special treatment is required, and after about eight to ten days, the infection has resolved (WHO, 2018a; AGES, 2020). Antibiotics are rather contraindicative. A retrospective study of an outbreak showed that antibiotic treatment during exposure was associated with a secondary infection (Simjee, 2007). This is because the bacteria produce more toxins when exposed to antibiotics (AGES, 2020). Water and electrolyte replacement is usually sufficient. However, in cases with HUS, intensive treatment, such as blood washing, may be required (AGES, 2020).

2.2. Prevention of foodborne infections

2.2.1. Prevention of foodborne infections on industrial level

The goal at the industrial level is to ensure that foods low in bacteria reach households. Several tools and techniques can be used. One commonly used strategie is the HACCP (Hazard Analysis and Critical Control Point) concept. It was first developed in 1960 by the US National Aeronautics and Space Administration (NASA). The aim was to produce pathogen-free food with a long shelf life to ensure adequate nutrition for astronauts. However, NASA's HACCP approach was too stringent for commercial food production and was adapted to make it workable.

Figure 2 Listing of the "Hazard Analysis and Critical Control Point (HACCP)" concept

(LatestReport, 2021)

The concept consists of 7 principles, which can be seen on the right. It is a preventive method that helps to identify, evaluate, and control food safety hazards and ensure safe food products (FDA, 2017). Through the system, biological, physical, and chemical hazards can be prevented, reduced, and eliminated (Weinroth, Belk and Belk, 2018).

Two physically effective means of eliminating pathogens are heating and irradiation. Heating is the most common and most effective method. The bacteria are easily killed by pasteurization (AGES, 2022a). Irradiation can be used to destroy food poisoning bacteria in general, including *Campylobacter* and *Salmonella*. However, EFSA does not recommend it as the sole method, but as a complement to other prevention methods. Irradiation is rather uncommon in the EU and foods must be labeled as "irradiated" or "treated with ionizing radiation" (EFSA, 2011).

2.2.2. Prevention of foodborne infections on household level

As mentioned in the beginning, about one third of all foodborne infections occur in the domestic environment (EFSA, 2010; EFSA and ECDC, 2013; Byrd-Bredbenner et al., 2013). Around 80% of *Salmonella* and *Campylobacter* infections are associated with food prepared at home (Kennedy *et al.*, 2005).

There are several critical situations in which food can become contaminated at home. One of the most common ways is through cross-contamination. This occurs when food that is originally free of pathogens becomes infected through contact with contaminated food or inadequately cleaned kitchen utensils (EFSA, 2019; WHO, 2006). For example, chicken should not be washed under the tap because splashes of *Campylobacter* can be transferred to food or surrounding surfaces and cause contamination (Livsmedelsverket, 2022). Furthermore, cutting boards, knives, and dish towels are common vehicles for spread as well (EFSA, 2019). It is especially important to handle raw meat and other raw food ingredients properly and keep them separate (Livsmedelsverket, 2022).

The most effective prevention method for eliminating *Campylobacter*, *Salmonella* and *STEC* is proper heating. These pathogens are all heat sensitive. *Salmonella* is considered to be eliminated by heating to 70° for at least 15 seconds. However, it is important that the temperature is reached throughout the food, so it is recommended that food be heated above 70° for about ten minutes (AGES, 2022b). Microwave oven for reheating should be not preferred, because it leaves spots where bacteria can survive (WHO, 2006).

Adequate cooling, with a refrigerator temperature below 5 degrees is also crucial, as bacteria can multiply very quickly at room temperature. The “dangerous zone” for optimal growth is between 5 and 60 degrees. The bacteria are not killed by refrigeration, but growth is slowed or stopped, this is especially true for the three pathogens discussed in this thesis (*Camyplobacter*, *Salmonella* and *EHEC*) (Silvan & Martinez-Rodriguez, 2018; Silva and Gibbs 2012; Batt, 2014). However, other pathogens can grow below 5 degrees. For example, the third most common zoonotic pathogen in the EU, *Yersinia enterocolitca*, can grow below zero degrees, as can *Listeria monocytogenes* (Sun *et al.*, 2020; Saldivar *et al.*, 2018). To reduce further risks, food should not be stored for more than three days, and frozen food should be thawed in the refrigerator (WHO, 2006).

Hygiene in general plays a crucial part, especially hand washing. Humans can carry pathogens in their feces, therefore hand washing after using the bathroom is essential. In addition, pathogens can also be found on the skin/fur of domestic animals such as

cats, dogs, birds, and reptiles. Ruminants such as sheep, goats and cows are further vectors. Especially petting zoos can be a source of infection. Adequate hand washing after contact is of great importance to reduce the risk of transmission to other humans (WHO 2018a; AGES, 2020).

For consumers, there are two well-known guidelines for proper food handling.
First, the WHO's "Five Keys to Safer Food," which are as follows:

- Keep clean
- Separate raw and cooked
- Cook thoroughly
- Keep food at safe temperature
- Use safe water and raw materials (WHO, 2006)

Second, the "4C's" from the United Kingdom, which provide guidance about:

- Cleaning
- Cooking
- Chilling and
- Cross-contamination (Wills *et al.*, 2015)

The WHO guideline has been translated into 87 languages and contains 28 pages of detailed information on the proper handling of food (WHO, 2006). The 4C’s are kept simpler. However, they cover the same topics and are designed to help people gain knowledge about how to prepare food safely at home (Wills *et al.*, 2015).

Another source is the IFH homepage (International Scientific Forum on Home Hygiene). This organization is based in the United Kingdom and was founded in 1997. Its goal is to promote hygiene in the home. It provides scientific reviews, guidelines, training resources and fact sheets (IFH, 2019). Also the national food safety authorities in Austria (AGES) and in Sweden (Livsmedelsverket) offer information about the pathogens on their websites (AGES, 2022b; Livsmedelsverket, 2022).

2.2.3. Personal factors to prevent foodborne infections

There are several factors that influence whether or not a person practices healthy food safety at home. Knowledge is important, but studies show that just knowing what to do does not mean it will be done. A study by Mullan et al. found that although 86% of consumers said they knew that adequate hand washing reduced the risk of food poisoning, only 66% said they did it. Knowledge alone does not have a major impact on correct behavior, but it can serve as an essential fundament (Redmond and Griffith, 2003). Worldwide, food safety knowledge is inadequate among the population and needs to be improved as incorrect knowledge leads to unsafe food preparation practices (Redmond & Griffith, 2003).

Attitude has a stronger influence on behavior than knowledge. Attitude refers to one's thoughts and beliefs about a particular topic (Redmond & Griffith, 2003). This includes the personal risk perception. People with higher risk perceptions for certain foods have demonstrated safer practices (Mullan et al., 2010). Simply believing that unsafe food handling practices can lead to food poisoning can change behavior. (Redmond & Griffith, 2003). However, a positive attitude alone is not sufficient to ensure safe food handling, as there are discrepancies between stated and observed hygiene practices (Mullan et al., 2010).

A stronger influence on the correct handling of food has the previous behavior. Cooking and hygiene practices are habitual and automatic for many people and do not require thought or careful consideration (Mullan et al., 2010; Byrd-Bredbenner et al., 2007).

A difficult barrier to overcome is changing people's perceptions that the home is actually a high-risk place. People perceive themselves or someone in their family as less vulnerable to foodborne illness (Byrd-Bredbenner et al., 2007).

2.3. Differences in the social- and school system between Austria and Sweden

2.3.1. Policies

2.3.1.1. Parental leave

In Austria the parental leave (Elternkarenz) lasts until the child reaches the age of two. The entitlement is per family and there are various financial models to choose from. Parental leave may be taken by one parent only (mother or father) or by both parents on an alternating basis (Schmidt and Schmidt, 2021).

In Sweden, the so-called “föräldrapenning” allows each parent to take full-time leave from work until the child is 18 months old, which is shorter than in Austria. There is a so-called "mother's quota" and "father's quota,". Parents are allowed to receive 240 days of parental leave benefit each, 90 out of the total 240 days are reserved for each parent and cannot be transferred to the other parent. In some very rare exceptions, one parent can take the entire benefit, such as when one parent has custody, or the other parent is permanently ill (Duvander, 2021).

In both countries, parents are allowed to take the parental leave one month simultaneously. In Sweden those days are labelled as “double days” (dubbeldagar).
In addition, in both countries, all people have the same rights regardless of their parental status (i.e. biological, adoptive or foster parents), partnership status or sexual orientation (Schmidt and Schmidt, 2021; Duvander, 2021).

2.3.1.2. Maternity leave

In Austria, maternity leave (Muttersschutz) is granted for 16 weeks, eight weeks before and eight weeks after birth. It is mandatory and women are not allowed to work during this time. If there is a risk to the health of the mother or unborn child, women may leave earlier. In some cases (premature births, multiple births, or births by caesarean section), women are entitled to 12 weeks of postpartum maternity leave instead of eight. In some exceptional cases, even 16 weeks (Schmidt and Schmidt, 2021).
In Sweden, on the other hand, the “graviditetsspenningit” is obligatory for only two weeks before or after delivery. If the work is physically demanding and not possible for

pregnant women, they can claim the so called “pregnancy benefit”. A medical certificate is required to prove that the work poses a risk to the fetus. If it is not approved and they cannot take advantage of the pregnancy benefit, they are entitled to use part of the “parental leave benefit” (Duvander, 2021). The regulations for breastfeeding also vary. In Austria, mothers who work 4,5 to 8 hours a day are allowed to take 45 minutes off for what is called “nursing leave”. If the women works more than 8 hours, this time is doubled to either twice 45 minutes or once 90 minutes (Schmidt and Schmidt, 2021). Sweden also has a law that stipulates the right to breastfeed the child, but unlike in Austria, it does not specify how long and how often breastfeeding is allowed. There are no regulations or details on how to implement this in the workplace (Duvander, 2021).

2.3.1.3. Paternity leave

In Austria, paternity leave is not as widespread as in Sweden. As can be seen in Figure 3, data from the OECD in 2016 show that in Sweden the share of parental leave is almost the same, with 45% of men taking it, compared to less than 10% in Austria.
Only since 2017 has there been a "family time bonus" in Austria, which allows fathers to interrupt their employment within the first three months after the birth for a full-time leave of 28 to 31 days. This must be done in agreement with the employer. Since 2019, fathers living in the same household as the mother have been able to take one month of job-protected paternity leave. Again, the employer must agree (Schmidt & Schmidt, 2021). However, these measures did not seem to have an impact, as in 2020 the number of fathers claiming childcare benefits was at its lowest level since data were collected in 2008. Only 3.5% of fathers took advantage of it (Austria, 2021).

In Sweden the so called “daddy days” (pappadagar) allow the other parent or carer to stay home for 10 days. The other person is entitled to a total of 10 days, and it is supposed to be used to attend childbirth, care for older children, and/or participate in childcare when the mother comes home. It is most often used by the father of the child (Duvander, 2021).

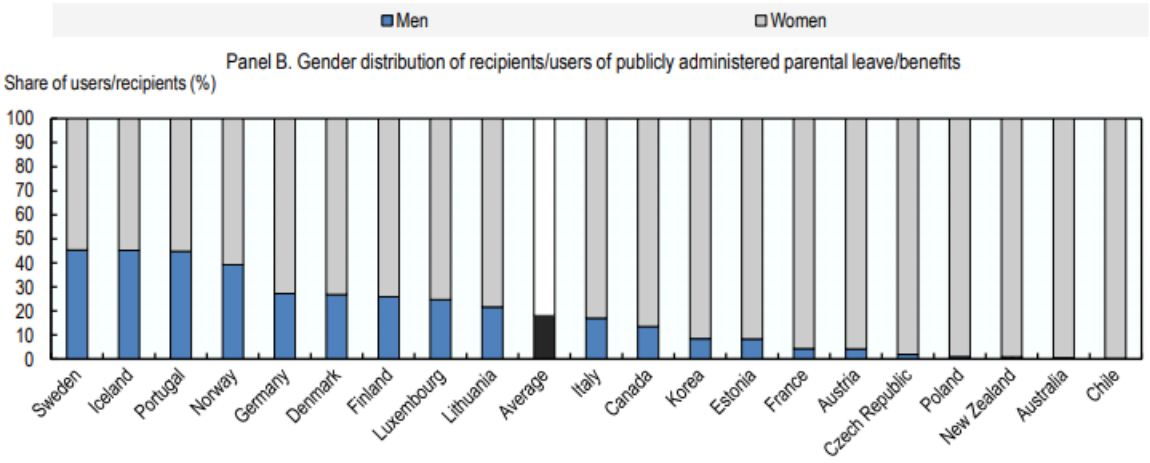


Figure 3 Comparison of the gender distribution of parental leave in different countries worldwide (OECD, 2019)

2.3.1.4. Employment polices

All regulations apply to people who are employed. An exception is self-employment, which is handled differently in Austria and Sweden. In Austria, self-employed persons have no entitlement to take parental leave. In Sweden, on the other hand, the self-employed pay into the social security system with a separate tax and receive the same benefits as employees (Schmidt and Schmidt, 2021; Duvander, 2021).

2.3.2. School education

Austria

In elementary school nutrition education is part of another subject called “Sachunterricht”. In secondary school, students can choose between two different types of school: the "New Secondary School" and the "Academic Secondary School". In the former, there is a compulsory subject "Nutrition and Household" with one hour per week in the second grade (RIS, 2021). In the second-named, the subject comprises 4 hours per week in 5th and 6th grade, which is not compulsory (Federal Ministry of Education Science and Research, 2020).

The subject is designed to enable students to perform tasks in private households, and also gain knowledge about economic and social issues. The awareness that life in the home is based on different values and norms should lead to open-minded, tolerant interaction with each other (RIS, 2021). The curriculum also includes topics on hygiene behavior and the connection to health, but it is rather a small part. Although the syllabus states that practical application of knowledge is an important part of nutrition education, it is often not feasible due to insufficient framework conditions such as lack of kitchens (RIS, 2021; Buchner and Zahra, 2009).

Sweden

Home economics is a compulsory subject in Sweden during the first nine years of compulsory education. It ends at the beginning of upper secondary school. It is divided into three parts: "Environment and Lifestyle," "Consumption and Personal Finances," and "Nutrition, Food and Health." The environmental part covers topics such as recycling in the home, the selection of goods and their impact on the environment and health, different routines and methods of washing and cleaning, the production and transportation of food and their impact on the environment and health. The division of labor in the household from a gender equality perspective is also discussed. The section on "Consumption and Personal Finances" covers topics such as household finances and what to consider when buying food. The last section deals with different baking and cooking methods, hygiene and cleaning when handling, preparing and storing food (Skolverket, 2018).

3. Subjects and Methods

3.1. Questionnaire structure

In September 2021, the first version of the questionnaire was created in English. It was then translated into German and Swedish, followed by a back-translation by a third person back into English (see final versions in the appendix). This ensured that the questions were worded the same in all languages and was intended to eliminate misunderstandings. In the end, only the German and Swedish versions were used for the survey. Google Forms was used as a tool to create the questionnaire. It consisted of a total of 45 questions and took about ten minutes to complete.

The first two questions were designed to ensure that participants had read the introductory text and were willing to participate, and secondly, whether they met the inclusion criteria. These were:

- Not being vegetarian or vegan
- Having at least one child under the age of 5 (stepchildren included)

Except for one, all questions were mandatory, it was not possible to omit them. The questionnaire contained single-choice and multiple-choice answers as well as Likert scales and open-ended responses. The main part consisted of 10 knowledge, 9 behavioral, and 7 attitudinal questions.

The knowledge questions were related to different pathogens and food preparation methods. The response options were "True," "False," and "I don't know". Some experts argue that the "I don't know" option compromises data quality and may result in incomplete and less informative data. Other publications do not support this assumption (Decastellarnau, 2017). The behavioral questions were asked using a Likert scale and single choice answers. For all the attitude questions a 5-point Likert scale was chosen. Likert scale is a non-parametric test and is used to determine attitudes and opinions from respondents, typically a 5- or 7-point ordinal scale is used (Sullivan and Artino, 2013).

3.2. Recruitment of study participants

The original plan for the recruitment was to share the online link with the help of kindergartens throughout Austria and Sweden via public registries as well as mother-child centers, clubs, associations and social media (Facebook, Instagram). Under the circumstances of the COVID-19 pandemic and the associated higher effort for these stakeholders, it was not possible to recruit enough participants through them. Therefore, the questionnaire was mainly shared online in targeted social media groups. In addition, inquiries were made directly in front of playgrounds and kindergartens in Sweden. There, participants were asked for their e-mail address and the questionnaire was forwarded to them. Filling it out directly on the tablet was not desired by the participants. The e-mail addresses were deleted after the survey was sent out.

Ethical approval for Austria was granted on 14/02/2022 (see appendix). In the period from November 2021 to March 2022, the questionnaire was available online.

3.3. Statistical analysis

The data were analyzed using IBM SPSS Statistics version 27 for Windows and Excel. At the beginning, descriptive statistics were used to create frequency distributions. Pie and bar chart, boxplot, histogram and a spider plot were used for visualization. A score was calculated for knowledge, behavior and attitude questions. Chi Square test was used to detect differences between the countries. The significance level was set at 5% ($p<0.05$).

For the attitude questions a median and the mean was calculated. There are controversial opinions on whether ordinal data can be converted into numbers and treated as interval data. Some argue that the result is not informative. The mean of, for example, "not important" is not really meaningful. Therefore, other researchers suggest using the median instead, to measure the tendency for Likert scale data. Other experts say that parametric tests can be used with an appropriate sample size of at least 5-10 observations and with normally distributed data (Sullivan & Artino, 2013). To test for normal distribution, the Shaphiro-Wilk test and the Kolmogorov-Smirnov test are very common. The Kolmogorov-Smirnov test is primarily used for a larger sample size (> 50 samples), while the Shapiro-Wilk test is more suitable for smaller sample sizes < 50 but can also be used for larger sizes (Mishra P, Pandey CM, Singh U, Gupta A, Sahu C, 2019). However, the Shapiro-Wilk test offers better power and is recommended by researchers and was therefore used in this thesis (Ghasemi and Zahediasl, 2012). Non-significance indicates a normal distribution. The attitude score for both countries was normally distributed (Austria: p= 0,567 and Sweden: p=0.207). Therefore, parametric variables (mean, median, standard deviation) and parametric test (independent sample T-Test) were conducted. Figure 4 displays the normal distribution of both scores combined (p=0,175) in a histogram.

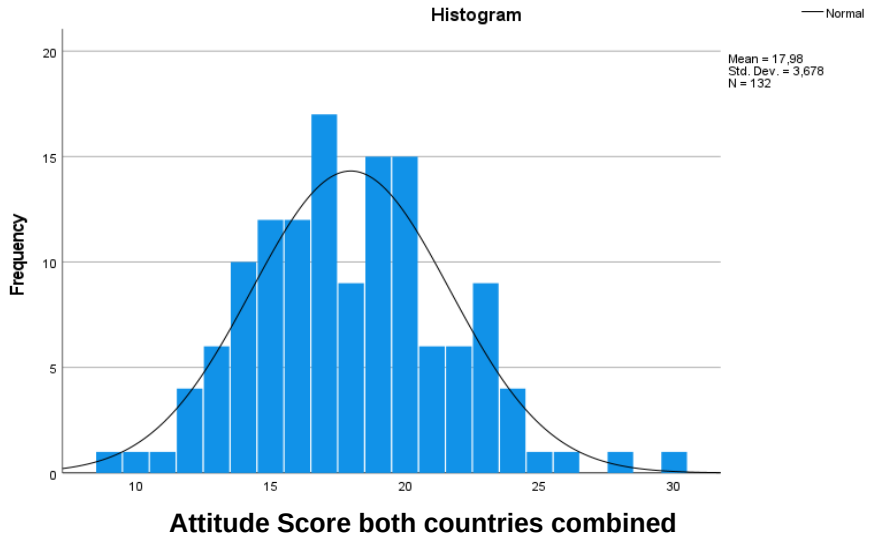


Figure 4 Normal distribution of the attitude score combined from Austria and Sweden

The knowledge and behavior score were not normally distributed. The Shapiro Wilk test showed a significant result (p = <0,001). For further testing, the nonparametric Mann-Whitney U test was used. To test for correlations the Point-Biserial correlation was used. A Pearson correlation couldn't be used, because it requires a normal distribution and no outliers (Schober and Schwarte, 2018).

The knowledge score had no outliers but was not normally distributed. The behavior score had outliers and was not normally distributed. The attitude score was normally distributed but had outliers. The Point-Biserial correlation is used when one variable is dichotomous (values coded 0 and 1) and the other variable is metric (Kornbrot, 2014).The outcome values are the same as for Pearson or Spearman namely +1 (positive relationship) to -1 (negative relationship) (Kornbrot, 2014). Furthermore, Spearman correlation was used to identify correlations between ordinal variables (Schober and Schwarte, 2018). There are different classifications of the correlation coefficient in the scientific world. However, a uniform opinion is that a coefficient of <0,1 is a negligible relationship and >0,9 a very strong one. The values between are debatable and the cut off points can be set arbitrary.

For the analysis the following classification was used:

Correlation Coefficient	Interpretation
0.00–0.10	Negligible correlation
0.10–0.39	Weak correlation
0.40–0.69	Moderate correlation
0.70–0.89	Strong correlation
0.90–1.00	Very strong correlation

Figure 5 Correlation coefficient used in this thesis (Schober and Schwarte, 2018)

Binary logistic regression was used to identify factors contributing to participant behavior. It attempts to explain the categorical dependent variables by multiple independent variables present at the same time. It is used to examine the relationship between variables and attempt to predict the probability of a new case. A normal distribution is not required. Associations are presented in terms of Exp (B), also called odds ratio (OR), with a 95% confidence interval (95% CI). Values above 1 indicate that the probability of the case falling into the target group increases, values below 1 decrease the probability. The coefficient (B) is the predicted change in log odds per unit increase on the predictor. In general, one can say that a positive regression coefficient indicates that the probability of falling into the target group increases. The Hosmer and Lemeshow goodness-of-fit test is used to verify the fitting of the model. Non-significance is preferred as it indicates that the model is a good fit (Srimaneekarn *et al.*, 2022).

Based on the behavior score, a new binary variable was created (0=negative behavior; 1=positive behavior), which served as the dependent variable. The following served as independent variables:

- Attitude score
- Working in the food industry (Yes/No)
- Knowledge groups (Low/Medium/High)
- Parents' food poisoning in the last year (Yes/No/I don’t know)

Hosmer and Lemeshow's test confirmed that the model fit the data well (p=0.154) (Srimaneekarn *et al.*, 2022).

4. Results

4.1. Descriptive analysis of socio-demographic data

Table 4 Sociodemographic data of the Austrian and Swedish participants

		Austria (n=67)		Sweden (n= 65)		Total (n= 132)	
		N	N%	N	N%	N	N%
Gender	Female	60	90	54	83,1	114	86
	Male	7	10	11	16,9	18	14
Age	< 30 years	21	31,3	11	16,9	32	24
	31-39 years	36	53,7	42	64,6	78	59
	>40 years	10	14,9	12	18,5	22	17
	average	34		35		35	26
	min-max	23-48		25-44			
Highest completed education	Grade school	1	1,5	/	/	1	1
	Upper secondary school	29	43,3	6	9,2	35	27
	University (Bachelor/Master)	32	47,8	53	81,5	85	64
	University (PhD)	3	4,5	4	6,2	7	5
	Others	2	3	2	3	4	3
Marital status	Married/with a partner	65	97	63	97	128	97
	Single/Separated/ Divorced/Widowed	2	3	2	3	4	3
Employment status	Full-time employed	7	10,4	35	53,8	42	32
	Part-time employed	22	32,8	4	6,2	26	20
	Self-employed	4	6	3	4,6	7	5
	Maternity leave	31	46,3	20	30,8	51	39
	Student	2	3	1	1,5	3	2
	Unemployed	1	1,5	2	3,1	3	2

Number of study participants

A total of 147 people took part in the survey, of whom 132 could be used for the evaluation. For Austria, 80 people took part in the survey. Five did not meet the inclusion criteria, they either were vegetarian or vegan or had no child under the age of five. Another two participants mistyped their age, typing “4”, and another six did not live in Austria but in Germany and Italy and were also excluded. In the end, there were 67 valid responses for Austria.

For Sweden, 67 people participated. One participant did not meet the inclusion criteria, and another mistyped the age (“3q”) and was therefore excluded. In the end, there were 65 valid responses for Sweden.

Gender and age

The total sample was composed of 86% (n=114) women and 14% (n=18) men.

The distribution within gender was not significantly different in the countries (p=0,384). The average age of the entire sample was 35 years. Participants in Austria were generally slightly younger, but the majority in both countries were between 31 and 39 years old.

Highest completed education

The highest completed level of education in the entire sample was university (bachelor's/master's) with 64%, followed by upper secondary education with 27%. However as seen in Figure 6 the level of education was lower in Austria, with 43% reporting upper secondary school as their highest level of education, compared to only 9% in Sweden. In Austria, around 50% had a bachelor's or master's degree, while in Sweden 81% had an university degree. The differences were statistically significant ($p < 0,05$). Grade school was chosen only by one participant in Austria, no one in Sweden chose this option. This question contained an open part for other levels of education, grouped "Others" in the chart. In Austria, this was once "nurse" and "diploma education", in Sweden it was once "polytechnic school" and "medical education".

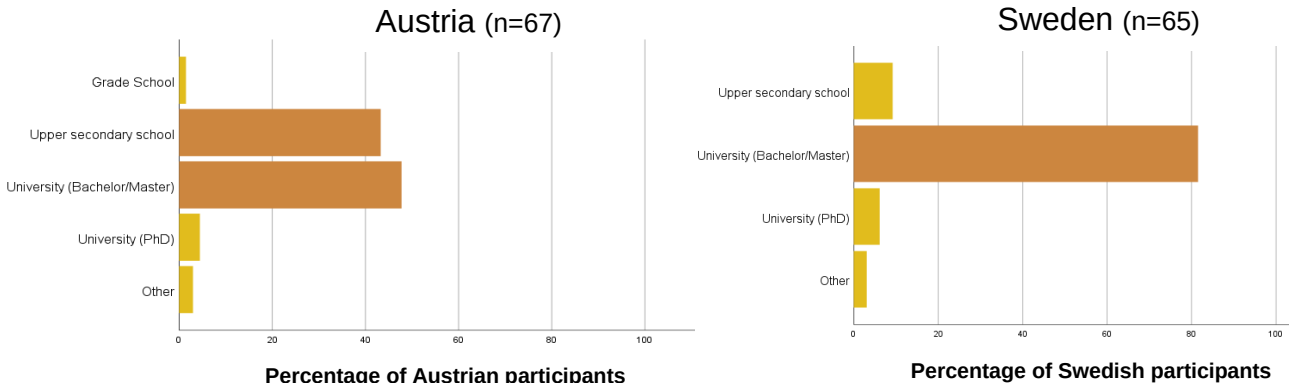


Figure 6 Highest completed education in Austria and Sweden

Marital status

The total sample, as well as the breakdown for both countries showed exactly the same distribution of the marital status. 97% were married or had a partner, the remaining 3% were either single, separated, divorced or widowed.

Children in the household

In both countries most of the children were between 24 months and 5 years old. In Sweden, there were slightly more children in the households (Sweden: M=1,72, SD: 1,21 / Austria: MW=1,49, SD: 0,68). Some families in Sweden had three children, while in Austria no family had three children. Only one family in each country had only one child under six months of age.

Employment status

There was a significant difference (p <0,05) between the countries when it comes to maternity leave and full-time employment. In Sweden, over 50% were employed full-time, whereas in Austria only 10% were. The majority in Austria were on maternity leave, while in Sweden only 31% were. No one of the whole sample chose “retired” or “sick leave”.

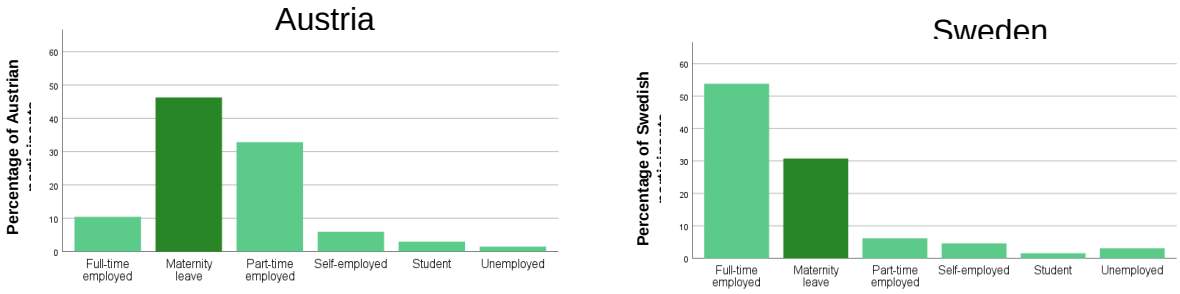


Figure 7 Current employment status of the participants in Austria and Sweden

A breakdown by gender shows that in Austria slightly more than half of the women were on maternity leave, followed by part-time employees. In Sweden, on the other hand, the majority of women were employed full-time followed by maternity leave.

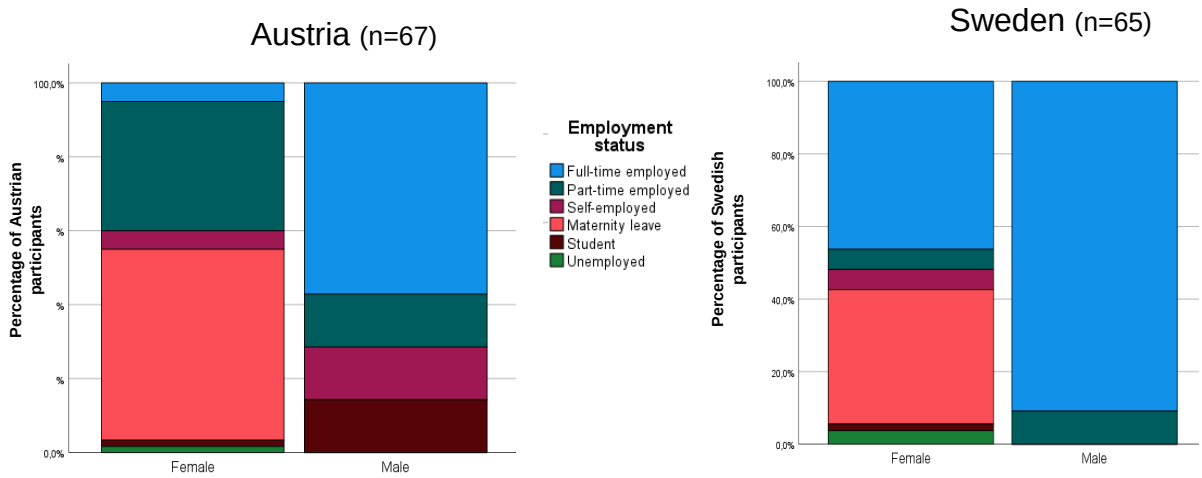


Figure 8 Current employment status of the participants in Austria and Sweden split by gender

The employment status is dependent on the age of the youngest child. Sweden had more children in the age group >24 months to 5 years. The results are influenced by this factor.

Federal States

Salzburg, with its population of about 158,000, and Uppsala, with its population of 238,000, accounted for more than half of the total sample (Magistrat Salzburg Stadt, 2022; Uppsala Kommun, 2022).

Table 5 Distribution of participants among the federal states in Austria and Sweden

Austria (n=67)		
	n	**%**
Salzburg	38	56,7
Lower Austria	12	17,9
Vienna	8	11,9
Upper Austria	3	4,5
Carinthia	3	4,5
Styria	2	3
Tyrol, Vorarlberg	1	1,5

Sweden (n=65)		
	n	**%**
Uppsala	34	52,3
Stockholm	15	23,1
Västerås	7	10,8
Gothenburg	6	9,2
Esklistuna	1	1,5
Karlstad	1	1,5
Umeå	1	1,5

4.2. General food safety information

COVID-19 pandemic

Due to COVID-19, a question was asked what percentage is worked from home. Unemployed persons and participants on maternity leave were excluded from this question. The percentage does not differ drastically between countries. Around 40% in each country did not work from home at all, and around one fourth worked from home full-time.

Table 6 Percentage of work from home due to Corona in Austria and Sweden

Work from home:	**Austria** (n=35)	**Sweden** (n=43)
	%	**%**
Not at all	40	37
25%	17	19
50%	11	5
75%	9	14
100%	23	25

Source of food safety advice

The majority in Sweden 68% and in Austria 61% never received any food safety advice concerning bacteria from a nurse/doctor, midwife or dietitian/nutritionist.

Food poisoning over the last year

The majority of parents and their children reported not having experienced food poisoning in the past year. In Austria, no parent reported having experienced food poisoning at all.

Table 7 Experience of food poisoning over the last year (parent and child) in Austria and Sweden

		Austria (n=67)		Sweden (n=65)	
		n	**%**	**n**	**%**
Parent	Yes	/	/	7	10,8
	No	64	95,5	49	75,4
	I don't know	3	4,5	9	13,8
Child/ren	Yes	2	3	8	12,3
	No	62	92,5	48	73,8
	I don't know	3	4,5	9	13,8

Source of food safety knowledge

The two most common sources from which people in Austria and in Sweden obtained their current food safety knowledge are the same, namely “a course at school/university” and “family and friends”. The source from which they obtained the least knowledge is also the same for both countries, namely “dietitian/nutritionist”.

An open question was also asked as to whether there was another source from which they obtained their knowledge. 16 people for Austria and 17 for Sweden filled in this question. The most frequent answer was "Internet" in general.

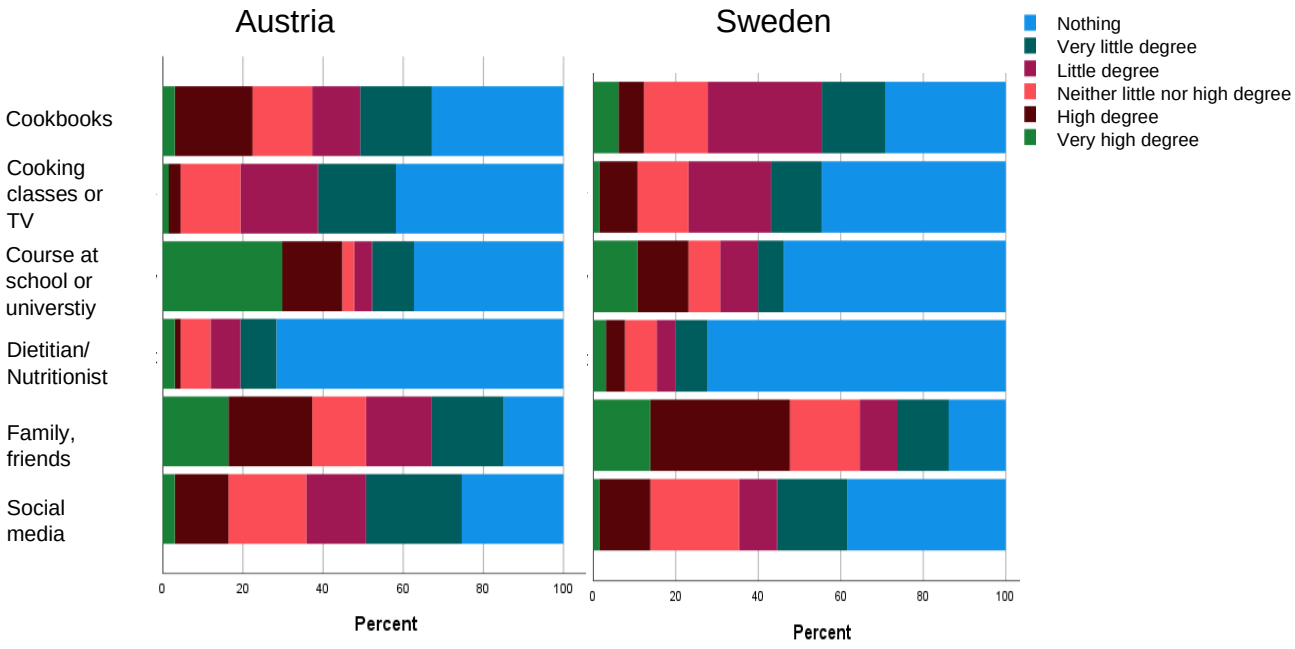


Figure 9 The degree of different sources of the current food safety knowledge in Austria and Sweden in percent

Work in a food company

The majority of participants did not work in a food company, 72% for Austria and 90% for Sweden.

4.3. Knowledge

4.3.1. Knowledge score and groups

A total of 10 knowledge questions were asked. The answers for knowledge questions were recoded into binary variables. Each right answers were coded as “1”, and every false and “I don’t know” answer as “0”. To equate the answer options "false" and "I don't know" is supported by literature (Andrade *et al.*, 2020). With the computed variable a knowledge score was calculated and divided into the following 3 groups:

- Low knowledge = < 2 right answers
- Medium knowledge = 3-5 right answers
- High knowledge = > 6 right answers

Table 8 Statistics of the knowledge score in Austria and Sweden

		Austria	Sweden
N	Valid	67	65
Mean		4,10	3,85
Median		4,00	4,00
Std. Deviation		1,350	1,481
Minimum		0	0
Maximum		7	7

A maximum of 10 points could be achieved, this was not reached by any participant in any country. That there might be no statistical difference is shown by the boxplot, as no median line lies outside of a comparison box. The Mann-Whitney-U-Test confirmed the non-significance between countries (p=0.368).

The minimum and maximum scores were the same, 0 and 7 points. The boxplot shows that the medians are the same for all except for a lower median for Swedish men. Austrian men show a positive skewness, while Swedish men show a negative skewness.

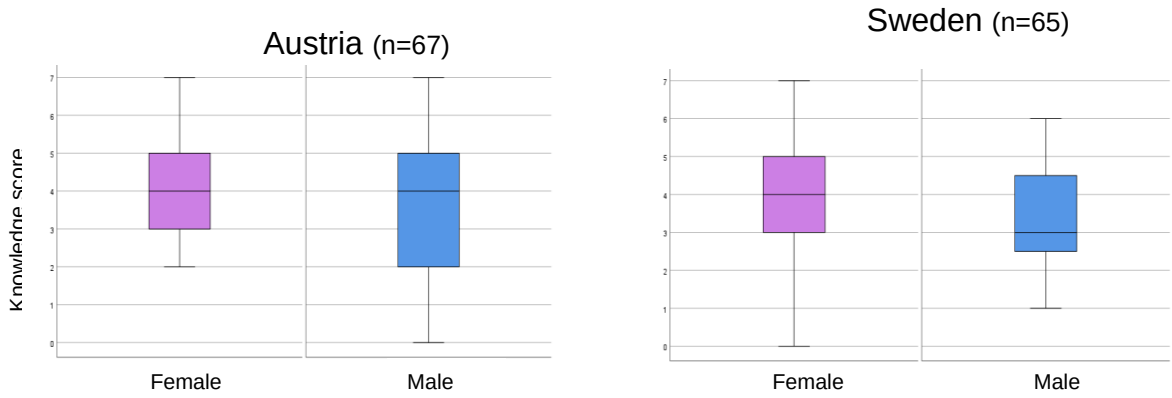


Figure 10 Boxplot: Knowledge score split by gender and country

4.3.2. Knowledge gaps and awareness of pathogens

Questions with percentages greater than 40% for the "false" or "I don't know" options were classified as knowledge gaps and indicated the greatest uncertainties within the sample. The following two questions had the most uncertainties:

"Healthy people may carry the bacteria *Staphylococcus aureus* in their nose that can cause foodborne illnesses"

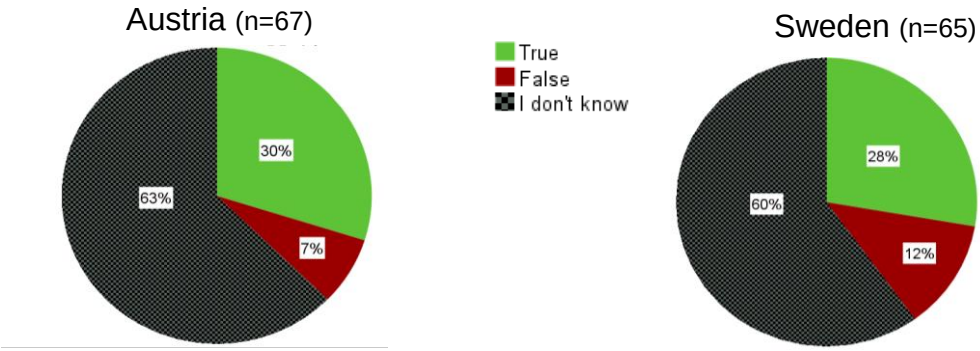


Figure 11 Knowledge gap 1: „Can people carry Staphylococcus aureus in their nose?" – Comparison in Austria and Sweden

In both countries there was a great uncertainty, with the majority saying they did not know.

Right answer: "True"

The bacteria are found in and on various parts of the body such as the nose, skin, rectum, vagina, gastrointestinal tract, and axilla. It is estimated that approximately half of all adults are colonized with the bacterium in one of the aforementioned sites (Sakr

et al., 2018), (Taylor and Unakal, 2022). However, the bacterium is predominantly found in the nose. Around 30% of the population carries *Staphylococcus aureus* asymptomatically and persistently in their nose (Sakr *et al.*, 2018).

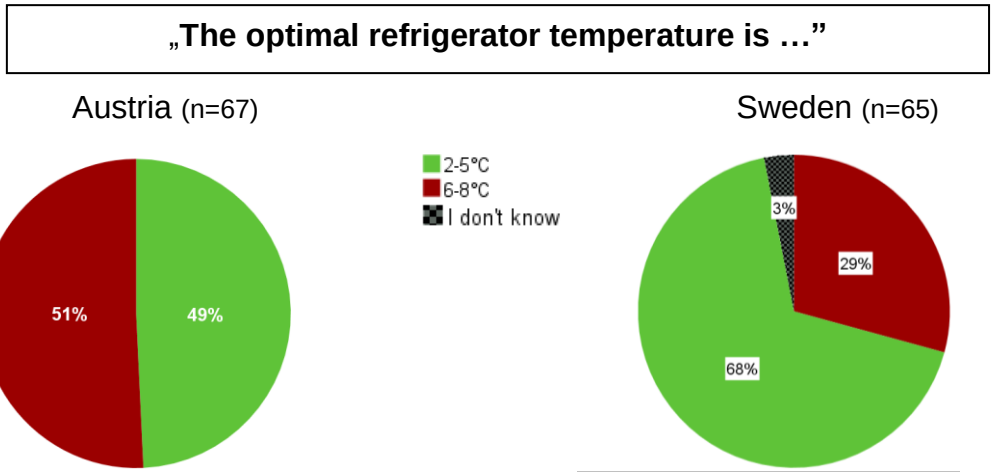


Figure 12 Knowledge gap 2: The optimal refrigerator temperature - Comparison in Austria and Sweden

In Austria the opinion on the optimal refrigerator temperature was almost evenly divided in 2-5°C and 6-8°C. Over 50% chose the wrong answer (6-8°C) while in Sweden it was only about one-third (Kennedy *et al.*, 2005).

The answers to the other eight questions did not differ significantly across countries and can be seen in Table 9. The percentage written in bold is the correct one.

Table 9 Percentage evaluation of the knowledge questions in Austria and Sweden (bold print is the correct answer)

	Austria (n=67)			Sweden (n=65)		
	True	**False**	**I don't know**	**True**	**False**	**I don't know**
Pathogenic bacteria can cause death among humans.	**64%**	3%	33%	**65%**	/	35%
Washing raw chicken in the sink is a good way to reduce the risk of an infection with the bacterium "*Campylobacter*".	27%	**36%**	37%	9%	**62%**	29%
Tasting the seasoning of raw ground beef puts one at risk for foodborne illnesses.	**64%**	12%	24%	**62%**	26%	12%
Food that is heated to 60°C is totally free of pathogenic (=disease-causing) bacteria.	16%	**69%**	15%	14%	**74%**	12%
Food that is heated in the microwave is totally free from pathogenic bacteria.	5%	**79%**	16%	3%	**82%**	15%

Freezing food is a way of killing pathogenic bacteria.	14%	**76%**	10%	11%	**78%**	11%
Bacteria can grow in vacuum-packed food.	**43%**	24%	33%	**74%**	9%	17%
A dishcloth may spread bacteria that can cause foodborne illnesses.	**97%**	/	3%	**91%**	/	9%

The spider diagram does not show the correct answers to the individual knowledge questions, but the largest discrepancies within the countries. All answers were pretty much the same, only the question whether bacteria can grow in a vacuum showed the biggest difference.

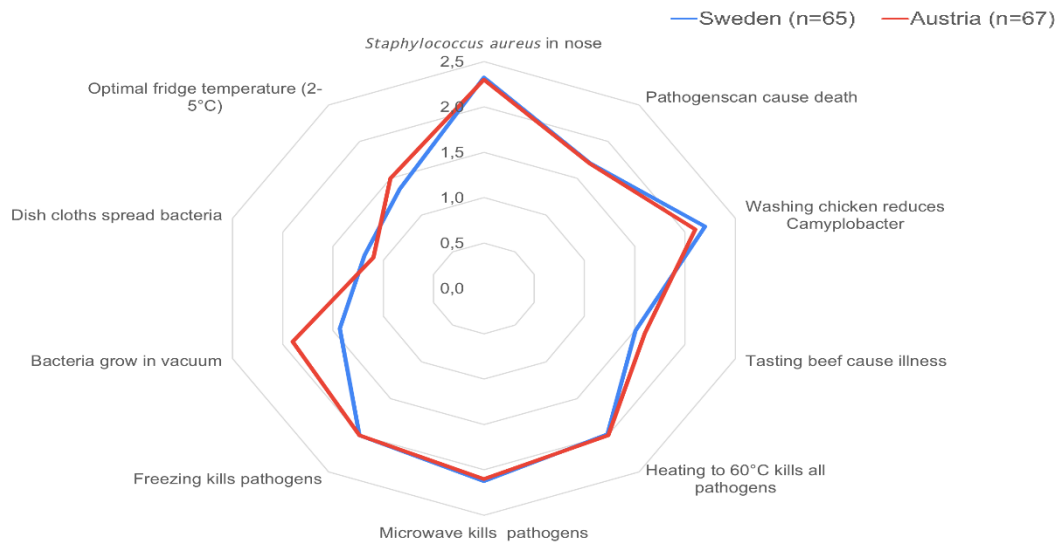


Figure 13 Spider plot for all ten knowledge questions – comparison between Austria and Sweden

Awareness of pathogens

Figure 14 shows the participants' association with specific pathogens related to raw eggs, raw ground beef and raw chicken.

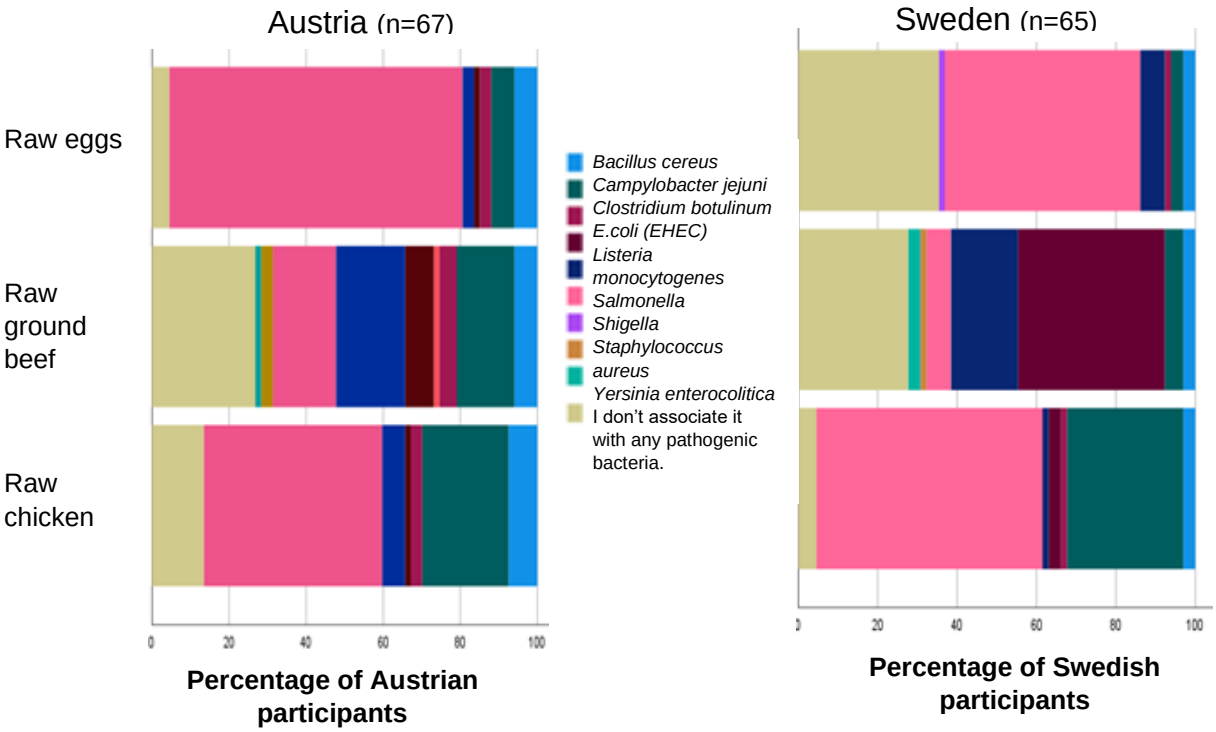


Figure 14 Participants' association of different pathogens in raw eggs, raw ground beef and raw chicken in Austria and Sweden

- **Raw eggs:**

In both countries, *Salmonella* is the pathogen most commonly associated with raw eggs. However, the association is higher in Austria with 76% than in Sweden with only 49%. Another major difference is that in Austria only 5% did not associate eggs with any pathogenic bacteria, while in Sweden 35% did.

- **Raw ground beef:**

For raw ground beef, the association of pathogens is not as consistent as for raw eggs and *Salmonella*. In Austria, the three pathogens most commonly associated with raw ground beef were *Listeria monocytogenes*, *Salmonella*, and *Campylobacter jejuni*.
In Sweden, the order was different, with *E.coli* predominating, followed by *Listeria monocytogenes* and *Salmonella*.

- **Raw chicken:**

In both countries, the two most common associated pathogens were: *Salmonella* and *Campylobacter jejuni*. In Austria, there was less awareness of pathogens in raw chicken. 13% of participants did not associate it with any kind of pathogen, while in Sweden only 5% did.

4.4. Behavior

A total of 9 questions were asked about behavior. A score was calculated labeled with 1 for a positive and 0 for a negative behavior.

The first three questions were related to food preparation in general. How often a thermometer was used for preparing raw chicken and raw ground beef and if different cutting boards were used for cutting raw meat and salad ingredients. A Likert scale was used to determine frequency. If they had chosen "often", "always" on the Likert scale, this was considered a positive behavior and received one point, the other alternatives "sometimes", "rarely", "never", "I never prepare it" received zero points.

The next four questions were related to whether the parents and their children try raw cookie dough with eggs and whether they try raw ground meat before cooking.
The answer "No", was a positive behavior.

The last two questions asked about the frequency of replacing used dish towels and the frequency of checking the refrigerator temperature. The responses "daily" and "weekly" were labeled as positive, and "monthly" and "less frequently" as negative. All behavior questions are discussed in detail below.

Food preparation

The use of a thermometer in the preparation of raw chicken and raw ground beef did not seem to be important in either country. In Austria, 85% never use a thermometer when preparing raw chicken and 88% does not use it when preparing raw ground beef. In Austria the answer option “always” was not chosen by anyone for these types of foods. In Sweden, 54% do not use it when preparing chicken and 80% do not use it for beef. The answer option “always” was chosen by 8% for the preparation of chicken, but no one chose it for the preparation of beef.

Using different cutting boards for raw chicken and salad ingredients is important for the participants. In Austria, 72% always use different boards, in Sweden 77%.

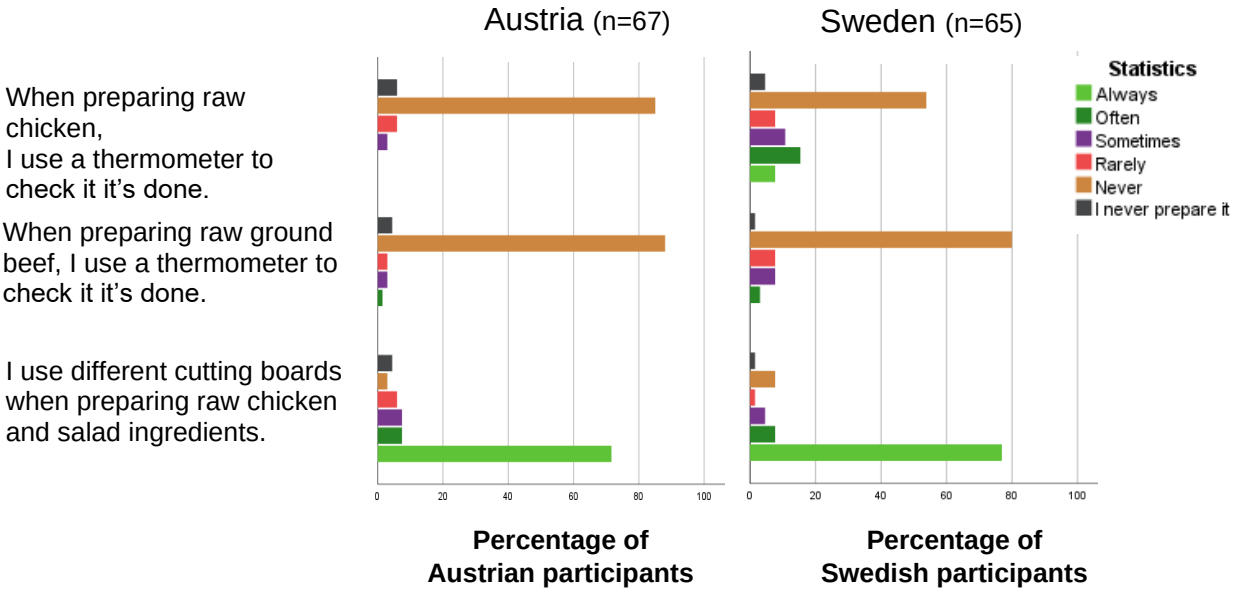


Figure 15 Frequency of using a thermometer and different cutting boards for the preparation of raw chicken and raw ground beef in Austria and Sweden

Tasting raw cookie dough

The following two questions were asked:

- "Do you occasionally eat raw cake/biscuit dough containing eggs?"
- "Do you occasionally let your child/children eat raw cake/biscuit dough containing eggs?"

There is a significant difference in the countries, for both questions. The results can be seen in Figure 16. In Sweden parents eat and let their children eat raw dough significantly more often (p=0,014; p =0,004), than in Austria. Interestingly, in Austria it is the case that parents themselves are more inclined to eat it, but do not allow their children to do so. In Sweden, this divide is not so great

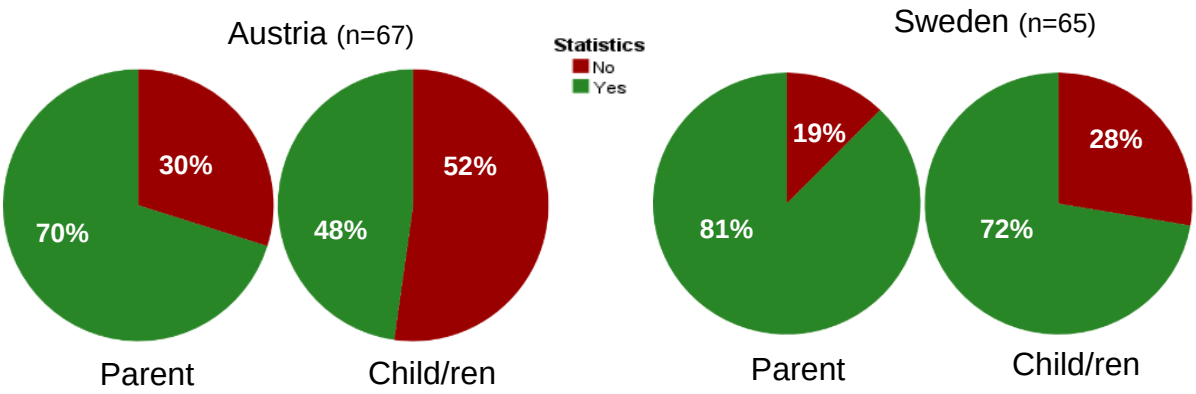


Figure 16 Percentage of parents and child/ren who have occasionally tasted raw cookie dough containing raw eggs in Austria and Sweden

Tasting raw ground beef

The following two questions were asked:

- "Do you occasionally taste the seasoning of raw ground beef before cooking it?"
- "Do you occasionally let your child/children taste the seasoning of raw ground beef before cooking it?"

The picture changes when it comes to tasting raw beef. 94% of parents in Austria do not taste raw ground beef and all of them do not let their children eat it. In Sweden, there seems to be slightly less concern about raw ground beef, 17% of the parents taste raw beef and some even let their children taste it.

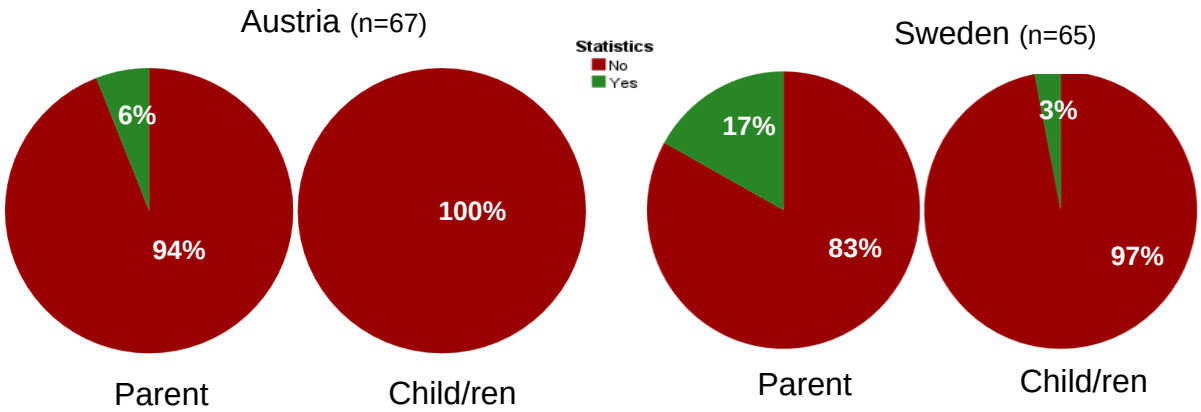


Figure 17 Percentage of parents and child/ren who have occasionally tasted raw ground beef before cooking in Austria and Sweden

Frequency of replacing dish cloths and checking fridge temperature

The results of the two behavioral questions can be seen in Figure 18. First, they were asked how often they replace used dish cloths with clean ones by boiling or washing it at 60°C, and second, how often they check the temperature of the refrigerator. Here was explicitly asked with an external thermometer, not by checking the display from a built-in thermometer that many refrigerators have on the outside. To prevent misunderstanding about an external thermometer, a picture of it was added, which can be seen on the right side.

Figure 18 External thermometer

Dish cloths:

In Austria, 34% replace dish cloth daily, while in Sweden only 6% do so. The majority of participants replace them weekly, 60% in Austria and 63% in Sweden. Only a small percentage of the Austrian participants, 3% each, replace it either monthly or rarer. In Sweden, participants tend to replace them less frequently, 23% replacing them monthly and 8% rarer.

Refrigerator temperature:

The temperature of the refrigerator is not measured as often. The majority in both countries measure chose “rarer”, which means less often than monthly, 96% in Austria and 94% in Sweden.

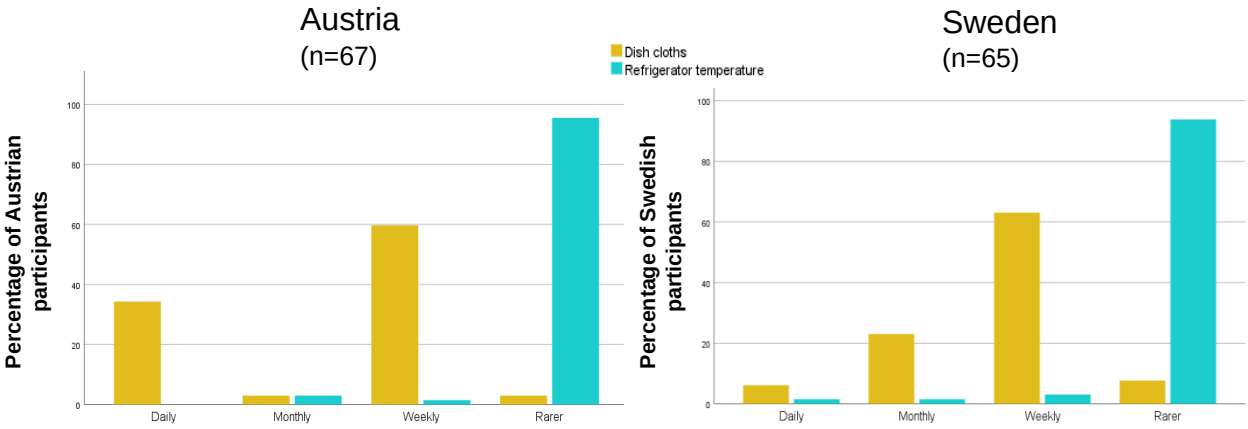


Figure 19 Percentage of frequency of replacing dish cloths and checking refrigerator temperature in Austria and Sweden

4.4.1. Behavior score

Behavior score

Nine questions were asked about behavior, the maximum score achievable was 9. The higher the number, the more positive the behavior was. No participant had an exclusively positive or negative behavior. The score differed significantly between the countries (p=0,006). With a median of 4,5 Austria showed a neutral behavior, while Sweden showed a slightly negative behavior.

Table 10 Statistics of the behavior score in Austria and Sweden

		Austria	Sweden
N	Valid	67	65
Mean		4,52	4,05
Median		4,00	4,00
Std. Deviation		,975	1,124
Minimum		2	2
Maximum		6	6

4.5. Attitude

The spider diagram provides an excellent overview of the differences in attitudinal issues within countries. The farther out the edges, the more important it is to participants, the closer to the center, the less important. The biggest differences are seen in the use of a thermometer when preparing chicken, the importance of avoiding raw eggs, and the daily replacement of dish cloths.

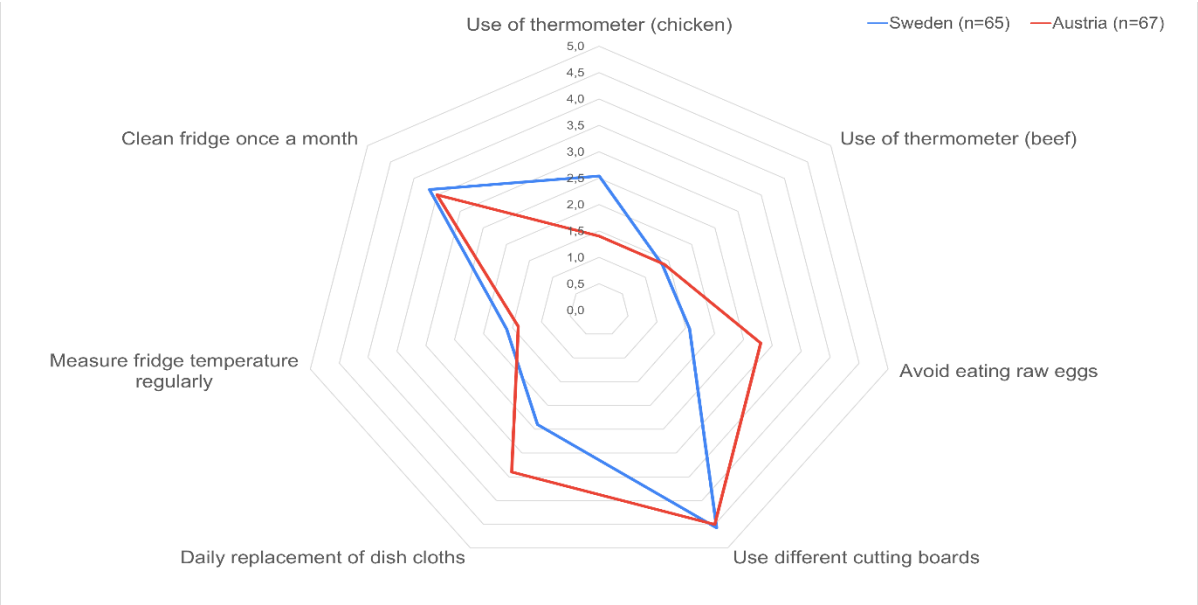


Figure 20 Spider plot for all seven attitude questions– comparison between Austria and Sweden

Figure 21 displays a detailed overview of the exact percentage of the importance for each question. The outcomes are discussed below.

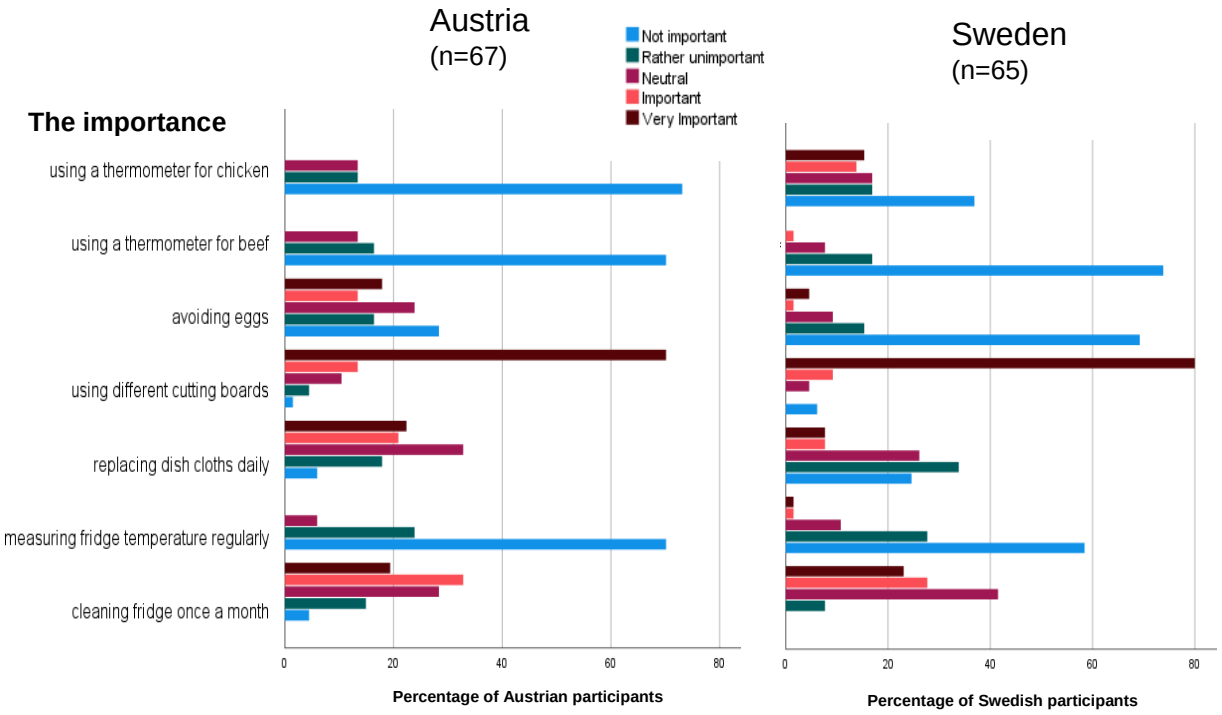


Figure 21 Evaluation of the seven attitudinal questions on the importance of various cooking and hygiene rituals in Austria and Sweden

Importance of using a thermometer for chicken and raw ground beef

Using a thermometer when preparing raw chicken or raw ground beef is generally not really important in either country. Interestingly, however, more people in Sweden chose the option “important” and “very important”, for both chicken and beef.

A total of 29% of Swedish participants indicated that it is “important” and “very important” for them to use a thermometer when preparing raw chicken, while no one in Austria selected this option. For beef, participants in both countries used a thermometer less frequently than for chicken. For no one in Austria is it “very important” or “important” to use a thermometer when preparing beef, in Sweden this was the case for only 1.5%.

Importance of avoiding eggs

The biggest difference in the attitude question can be seen with eggs. While in Austria it is “important” to “very important” for 31% to avoid raw eggs for example by not tasting raw cake/biscuit dough, in Sweden this is only the case for 6%. For the majority in Sweden, 69% it is not important to avoid raw eggs, while in Austria it is not important for only 28%.

Importance of using different cutting boards and replacing dish cloths

In both countries, the most common response for the importance of using different cutting boards was “very important”, 70% in Austria and 80% in Sweden. Replacing dish cloths seems to be more important in Austria, with 43% of the participants stating this is "important" and "very important”, while in Sweden only 15% chose these options.

Importance of checking refrigerator temperature

In both countries, it is not important to measure the refrigerator temperature regularly with an external thermometer. For 70% in Austria and 59% in Sweden it is not important. Interestingly, no one selected the option “important” or “very important” in Austria, while 3% in Sweden selected this option.

Cleaning refrigerator once a month

Other than measuring the refrigerator temperature, cleaning the refrigerator is of greater importance. In Austria, 52% consider it as “important” and “very important” to clean the refrigerator once a month. In Sweden, almost as many, namely 51% chose this option.

4.5.1. Attitude score

A total of seven questions were asked about attitude, using a 5-point Likert scale that showed the following statistics:

1= not important

2= rather unimportant

3= neutral

4= important

5= very important

The minimum achievable score was 7 and the maximum 35. The mean and the median were slightly lower in Sweden. A T-test for independent samples showed no statistical difference between countries (p=0.396).

Table 11 Statistics of the attitude score in Austria and Sweden

		Austria	Sweden
N	Valid	67	65
Mean		18,25	17,71
Median		18,00	17,00
Std. Deviation		3,611	3,753
Minimum		9	10
Maximum		28	30

5. Discussion

5.1. Results

There was a significant difference between the countries regarding the employment status. In Austria, most women were on maternity leave, followed by part-time employment, while in Sweden the majority of women were employed full-time followed by maternity leave. The results in this thesis show a large difference in the share of part-time employment among women. Part-time employment seems to be less common in Sweden. However, there are policies in Sweden that would allow parents to reduce their working hours until the child is eight years old or enters first grade.
In Austria, part-time work for women is more common. Parents are allowed to work part-time until the child's seventh birthday or until the child starts school. Furthermore, they are protected against dismissal until their child is four years old (Schmidt and Schmidt 2021; Duvander 2021). The differences between the countries cannot be explained by a lack of regulations, but rather by the fact that in Sweden the upbringing of children is more supported by the government to be shared equally by the parents. It is very common for one parent to stay at home full-time while the other partner works full-time (Duvander, 2021). In Austria, it is more common for the father to work full-time, while the mother stays at home and starts working part-time when the child turns two (Schmidt and Schmidt, 2021).

The number of food poisoning cases was low in both countries. In fact, in Austria, no parent reported a foodborne illness during the past year. However due to underreporting and false interpretation the number might be much higher (WHO, 2017; Byrd-Bredbenner *et al.*, 2013). Foodborne infections often come with “flu-like” symptoms and is often not further investigated and therefore not reported to public health authorities (Byrd-Bredbenner *et al.*, 2013; Redmond and Griffith, 2003).

The majority of the participants (> 60%) never received any kind of food safety advice concerning pathogens from a nurse/doctor or midwife. And the main source of their current food safety knowledge is derived from either school/university or family/friends. A study conducted by Kennedy et al. found that more than 50% reported that they received their current food hygiene education from their parents or grandparents, followed by school. Interestingly, only 5% cited friends as their primary source (Kennedy *et al.*, 2005). A study of 529 students in Sweden found that within the family,

mothers were the most important source of food safety knowledge, especially for girls. Boys showed that they trusted fathers and the media to a greater extent (Lange et al. 2017).

Austria showed a lower level of education, with an almost equally distributed percentage in the “upper secondary” and “university (bachelor's/master's)” group. Sweden had the most only in the “university (bachelor's/master's)” group. However, higher education does not necessarily mean a higher knowledge in food safety. There was no correlation between the highest completed education and the three knowledge groups (p=0,201). Looking at the knowledge score, no correlation was found for Sweden (p=0,928), but there was a weak positive correlation for Austria (0.353; p=0.003).

The majority in both countries had a medium food safety knowledge (Austria: 79%, Sweden 71%). They answered 3 to 5 out of 10 questions correct. However, Austria showed less participants being in the low knowledge group, only 9% fell into this category while in Sweden it was double the amount. The calculated knowledge score did not differ significantly between the countries (p=0,368) and between the genders (p=0,836). The median of the knowledge score for women in Austria and Sweden was the same, namely four. A difference was seen in the minimum and maximum scores. In Austria, no woman gave fewer than two correct answers, while women in Sweden gave. A comparison between men showed that the median for Swedish men was lower (Mdn: 3) than in Austria (Mdn: 4). This may support the assumption that higher education does not equate to higher food safety knowledge, as the Swedish men had a higher level of education than the Austrian men: 91% reported university (bachelor's/master's degree) as their highest completed education, while in Austria only 43% did so. However, the sample of men was quite small, with only 7 Austrians and 11 Swedes.

Knowledge was only slightly affected by whether a person works in the food industry or not. A weak but significant positive correlation was found between knowledge score and working in the food industry (r=0.210, p=0.015).

The biggest difference between the countries was seen in eggs. Parents in Sweden eat and let their children eat raw cookie dough significantly more often ($p = < 0.005$). Their attitude towards the importance of avoiding eggs is also significantly lower. For only 6% of Swedish participants, it is important to very important to avoid raw eggs, for example, by not trying raw cookie dough, compared to 31% of Austrians. In Sweden, more than one-third of participants did not associate eggs with any pathogen, while only 5% did so in Austria. The low-risk perception of participants in Sweden can be explained by the fact that eggs are generally seen as safe in Sweden. This awareness was achieved through strict regulations introduced after a major *Salmonella* outbreak in 1953 (National Veterinary Institute, 2020). Since then, feed is heat treated and if *Salmonella* is suspected on a farm, the entire flock is euthanized (Axén *et al.*, 2020)

Risk awareness of beef is high in both countries and did not differ significantly, but parents are more likely to try raw ground beef in Sweden (17%) compared to only 6% in Austria. It appears that in Austria there is generally a greater awareness of the risks associated with pathogens and raw animal products, e.g., no parents indicated that they let their children taste ground beef, whereas this was the case in Sweden (although only 3%).

Despite the use of a thermometer is recommended when preparing meat, it is not a high priority in Austria and Sweden (WHO, 2006). Some comments on the questionnaire stated that they can "see" if the chicken is done and therefore do not use a thermometer. This type of control appears to be widespread, as also noted by Langsrud et al. In their study, they identified various determinants that people use to rate meat as sufficiently cooked. The most cited was cooking time, based on experience, followed by color. Here, the outside color was a more important indicator than the inside color. However, the color change of chicken occurs below 60 °C and is therefore insufficient as an indicator (Langsrud *et al.*, 2020; Byrd-Bredbenner et al. 2013). The use of a thermometer was the least mentioned in the study. Their study population included families with young children and pregnant women, which is of particular concern as they are among the vulnerable groups and should be especially cautious (Langsrud et al., 2020).

A general reluctant behavior towards thermometers has also been observed in other studies. Byrd-Bredbenner et al. found that although people were aware of and knew about the potential health risk from eating undercooked meat, they did not use it. Participants described it as too inconvenient and difficult (Byrd-Bredbenner et al. 2013).

For most people, it is not important to check the refrigerator temperature regularly with an external thermometer. A common misconception seems to exist regarding the correct refrigerator temperature. In Austria, half of the participants stated that the correct temperature is 6-8°C, while in Sweden it was only one third. This lack of knowledge could also be observed in other countries such as the USA, UK, Ireland and Australia (Byrd-Bredbenner et al. 2013). Redmond and Griffith found that up to 93% of consumers did not know that the correct temperature is 0 to 5 °C (Redmond and Griffith 2003).

Cleaning the refrigerator was more important than controlling the refrigerator temperature. Over 50% in both countries indicated that it was important to very important to clean the refrigerator once a month.

Potential hazards from cross-contamination seem to be known, as 70% in Austria and 80% in Sweden stated that it is very important for them to use different cutting boards when preparing raw animal products and salad or cooked foods. That goes along with a study by Griffith et al, which found that it is important for up to 90% to use different chopping boards (Redmond and Griffith 2003).

Over 40% of the Austrian participants indicated that it was important to very important to change dishcloths daily, while this was the case for only 15% of the Swedish participants. This is concerning because it has been reported that *E. coli* can survive in dishcloths for at least 48 hours (Byrd-Bredbenner et al. 2013).

5.2. Influencing factors for a positive behavior

Austria showed a significantly more positive behavior in the home environment than Sweden (p=0,028). This could be due to the fact that more people in Austria worked in the food industry and are used to handling food correctly. In Austria, 28% of

respondents reported having worked in a food business, e.g., as a cook, compared to only 10% in Sweden. This could explain why the Austrian respondents had lower education but higher knowledge of food safety, since an apprenticeship as a cook for instance, does not require an university degree.

Only a weak correlation was found between the knowledge score and a positive behavior (r= 0,210, p=0,016). Knowledge alone is not a good predictor for a correct behavior (Redmond and Griffith, 2003). Studies repeatedly show that knowledge alone has very little, if any, impact on actual behavior (Marklinder *et al.*, 2022).

Another factor that influences proper behavior is the attitude. A relationship was seen between the attitude and the behavior (p=0,008). The attitude score in general did not differ significantly between the countries (p=0,396). Austria showed a slightly more negative attitude with a median of 17 compared to 18 in Sweden. However, the attitude was neither positive nor negative, but neutral with a combined median of 17.5.

The past behavior and the personal risk perception influences the current behavior on a greater extent (Mullan, Wong and O'Moore, 2010). Studies show that individuals with lower risk perception engage in less healthy behaviors. There is a correlation between risk perception and safe food handling behaviors (Mullan et al. 2010). Parents who were aware of the potential risks of raw eggs were significantly less likely to let their children try raw cookie dough. Austria showed a higher correlation (r=0.497; p= <0.001) than Sweden (r=0.315; p=0.011).

Binary logistic regression was used to predict behavior. It showed that gender (p=0,939), age (p=0,612), knowledge (p=0,885) and working in the food industry (p=0,107) did not significantly influence positive behavior. Attitude score in general was also not significant but almost (p=0.053).

5.3. Critical reflection of the questionnaire

The design of the questionnaire can influence the responses, especially critical is the design of the Likert scales. One of the most important decisions is how many categories to choose. There are different opinions among scientists (Decastellarnau,

2017). There is evidence that more than 2 points should be used in any case. Multiple categories allow the intensity of the attitude to be assessed. Too few categories may limit the ability to interpret the data in terms of the extent of agreement or disagreement. Too many options can affect the clarity of the meaning of the options and limit the ability of respondents to make clear distinctions between them, making it difficult to give meaningful labels to individual responses (Decastellarnau, 2017).

There are also different opinions regarding the neutral alternative. The neutral option affects the quality and studies show that it increases the acquiescence but decreases the likelihood that respondents will choose the extreme options (Graeff, 2005). The absence of a neutral item forces respondents to select an option that may not reflect their true attitudes. Studies show that a neutral option leads to a higher respondent satisfaction (Decastellarnau, 2017).

In this questionnaire, a 5-point bipolar Likert scale with a neutral mean was chosen, also considering the disadvantage that respondents might not choose extreme values and may tend to choose the neutral option (Decastellarnau, 2017). This was also the case for the attitude questions, as no one chose the extreme answers "not important" or "very important" for any question. Also, the result of the attitude questions, being neutral in both countries could be influenced by offering a neutral option.

5.4. Limitation of the study

A limitation of the study is that the study population is not representative for whole Austria and Sweden. First, because the sample size was rather small (Austria: n=67; Sweden: n=65). However, in regard of the COVID-19 pandemic, recruitment opportunities were limited, and most participants were recruited via social media and direct recruitment. Second, the majority came from one city each (Salzburg and Uppsala). Gender distribution was unequal, with 86% women and only 14% men. However, nutrition-specific studies usually have a higher participation of women, as they often show a stronger interest in the topic. In Austria three times more people worked in a food industry, which influence the outcome and therefore cannot be transferred to the general population.

Another limitation is the questionnaire itself, especially with regard to the questions on behavior. They are self-reported and therefore increase the risk of bias. Studies consistently show that self-reported practices do not correspond well with observed food safety behaviors (Redmond and Griffith, 2003; Byrd-Bredbenner *et al.*, 2007).
For example, in one study, 85% of participants reported washing their hands after handling raw foods, whereas this was not observed among anyone (Redmond and Griffith, 2003).

A very common response bias that can occur in social studies is "social desirability." This is the tendency of participants to answer in the way that is most favorable to them. For example, participants might know that they should not taste raw ground beef and indicate that they do not, even though they do. Observational data would have revealed actual behavior (Redmond and Griffith 2003).

Another point to consider is the labeling of "positive" and "negative" behavior. Tasting raw dough containing eggs was indicated as negative behavior, but for Sweden it may not be necessary to label is as negative, since Swedish eggs are considered salmonella-free, and it is not a problem to consume raw eggs. This may have biased the behavioral score for Sweden and may be the reason for the significant difference in behavioral scores between countries.

The behavior question about using different cutting boards when preparing chicken and salad ingredients might have been misinterpreted. Although it was explicitly asked if they use separate boards, comments on the questionnaire were that they did not use different boards but clean them carefully in between. Perhaps participants equated “use different” with “use the same but clean in between”. This distinction is important because many people consider rinsing cutting boards to be sufficient (Redmond and Griffith, 2003).

5.5. Conclusion and forecast

In the course of the study, it was found that there are cultural differences between the countries. In Sweden, equality is an integral part of the culture. This attitude is already taught in school. Comparing the school curricula, both teach equality, but there is more emphasis in Sweden. This egalitarian attitude is therefore natural for Swedish adults.

One example is paternity leave, which is quite new in Austria, while it has been a permanent feature in Sweden for a long time. In Sweden, the upbringing is almost equally distributed, while Austria is far from sharing it equally. This finding could be an incentive to promote equality much more strongly in Austria and to conduct better campaigns to embed it in the culture as well.

The results showed that knowledge alone does not influence correct behavior to any great extent. However, knowledge enables consumers to make informed decisions about their actions (Redmond and Griffith 2003).

Many people have their routines when it comes to cooking. It is a repeated automatic behavior that doesn't need a lot of thinking. When something is learnt new, like cooking, it needs a lot of effort in the beginning and the action is thought through in detail. Once it is learned well it becomes an automatic behavior and is not questioned anymore (Wheatley and Wegner, 2001). Once a habit is established, it is difficult to change (Byrd-Bredbenner et al., 2013). Therefore, proper behavior should be learned from an early age. On the one hand in schools with more focus on practical implementation, and on the other hand in the home environment by learning from parents.

The school education should be expanded, focusing on practical implementation, as it has been shown that people who prepare food least frequently are the most dangerous cooks (Fischer, Frewer and Nauta, 2006).

Educating expectant parents is of great importance as their habits will be passed on to their child/children. It is important to dispel misconceptions in the population as this leads to unsafe implementation of food preparation practices. One example is the widespread misinformation about the refrigerator temperature. Improper refrigerator temperature is a risk factor for foodborne illness outbreaks at home (WHO, 2006).

Country-specific differences should be considered. Since more women in Austria are responsible for raising children, measures should be taken to provide them with targeted information. A study with women confirmed that attending a food safety course has an impact on the behavior (Marklinder et al., 2022).

Many women do not receive food safety advice from midwives, this could be a point to implement more food safety advice.

In Sweden, on the other hand, where both parents share the upbringing almost equally, fathers and mothers should be educated equally. Lange et al. showed that girls and boys also differed in where they were most likely to obtain their food safety knowledge. It was reported that girls cited their mothers as the most important source, while boys cited their fathers. Therefore, it is important to educate both parents (Lange et al. 2017). It may be of interest to investigate men's knowledge, behavior and attitudes in more detail in further studies. This would be particularly important in Sweden, where child upbringing is evenly distributed, and men are therefore also responsible for cooking at home. In Austria, however, the focus should be on women's education as long as the proportion of paternity leave does not increase.

6. Summary

Although governments around the world are doing their best to improve the safety of the food supply, the incidence of foodborne illness remains a major health problem. Therefore, proper handling of food at all stages of its preparation and storage, from farm to fork, is crucial. Three common pathogens responsible for most foodborne incidents in the EU are *Campylobacter*, *Salmonella* and *STEC*. These are mainly found in animal products. Only a small proportion of the pathogens can cause serious illness. Children under five years of age are particularly at risk, for them even normal diarrhea can be life-threatening.

Foodborne illnesses occur to a large extent in the home environment, but with proper food handling, these diseases can be easily prevented. In the frame of the master thesis the current knowledge, attitude and behavior of Austrian and Swedish families with children under the age of five years were investigated. Focus was put on knowledge, attitude and behavior of handling raw minced meat, raw chicken and raw eggs. Minced meat is particularly risky because pathogens are very well distributed throughout the meat when grounded, while a whole piece of steak is less of a risk. Chicken is often undercooked for taste reasons and cutting chicken on a board that is also used for salad can lead to cross-contamination. Eggs are associated with *Salmonella* and eating dough containing unheated eggs may pose a risk for infection.

Through an online survey, data were collected between November 2021 to March 2022. Sixty-seven valid responses for Austria and 65 for Sweden were evaluated. The study population consisted mainly of women, the average age was 35 years, and the majority had a bachelor's or master's degree. The goal was to examine factors that influence behavior and also to explore social differences between countries.

The biggest difference in the social sphere was seen in gender equality. It is deeply rooted in Swedish society and can be seen throughout the community. It starts at school, where a lot of attention is paid to this issue, and continues throughout life, as in Sweden child rearing is shared almost equally between parents, whereas this is not the case in Austria, less than 5% of fathers take paternity leave, compared to 45% in Sweden. This also affects employment status, as the data had showed. The majority of women in Sweden work full-time, while in Austria the majority were on maternity leave.

The data displayed a large knowledge gap regarding the correct refrigerator temperature. Knowledge of this was particularly poor in Austria, where half of the participants indicated that 6-8° was the correct temperature. Knowledge was better in Sweden, where only one-third gave the wrong answer. A lack of hygiene was also noted in both countries, with the majority changing dish towels only once a week, which is concerning because pathogens can survive in them for days, contributing to cross-contamination. The use of a thermometer to check if meat is at an appropriate temperature was not very important in either country. This result is widespread and has been found in other studies too.

The other major difference between the countries is the risk awareness for eggs. In Sweden, it is much lower. For example, ¾ of Swedish children are allowed to taste raw cookie dough containing eggs, while in Austria only half of parents reported this.
Eggs and chicken meat are free of salmonella in Sweden because the country implemented strict control strategies after a large outbreak in the 1950s.

Consistent with other studies, the data showed that behavior is influenced only to a very small extent by a person's knowledge. Practical application of knowledge is critical to creating healthy cooking habits in the home environment. Therefore, the focus should be on expanding practical application in schools and universities. Behavior is complex and is influenced, among other things, by a person's attitude and personal perception of risk. This thesis reinforced the need to raise awareness of the possible risks in the home environment.

It is important to educate expectant parents and make them aware of the potential health risks that can occur at home and the negative impact this can have on their children, as many illnesses can be prevented with simple measures such as adequate heating, cooling and good hygiene.

7. Zusammenfassung

Trotz alledem, dass Regierungen auf der ganzen Welt ihr Bestes tun, um die Sicherheit der Lebensmittelversorgung zu verbessern, sind lebensmittelbedingte Erkrankungen nach wie vor ein großes Gesundheitsproblem. Daher ist die ordnungsgemäße Handhabung von Lebensmitteln in allen Phasen der Zubereitung und Lagerung - vom Erzeuger bis zum Verbraucher - von entscheidender Bedeutung. Die drei häufigsten Krankheitserreger, die für die meisten lebensmittelbedingten Erkrankungen in der EU verantwortlich sind, sind *Campylobacter, Salmonellen* und *STEC*, welche hauptsächlich in tierischen Erzeugnissen aufzufinden sind. Schon eine geringe Menge der Erreger kann schwere Krankheiten verursachen. Kinder unter fünf Jahren sind besonders gefährdet, da für sie eine normale Diarrhö lebensbedrohlich sein kann. Lebensmittelbedingte Krankheiten treten zu einem großen Teil im häuslichen Umfeld auf, können aber bei richtigem Umgang mit Lebensmitteln leicht verhindert werden. Im Rahmen dieser Masterarbeit wurden das aktuelle Wissen, die Einstellung und das Verhalten von österreichischen und schwedischen Familien mit Kindern unter fünf Jahren untersucht. Der Schwerpunkt lag auf dem Wissen, der Einstellung und dem Verhalten im Umgang mit rohem Hackfleisch, rohem Huhn und rohen Eiern. Hackfleisch ist besonders risikobehaftet, da sich die Krankheitserreger beim Zerkleinern sehr gut im Fleisch verteilen, während ein ganzes Stück Steak ein geringes Risiko darstellt. Hühnerfleisch wird aus geschmacklichen Gründen oft nicht durchgebraten, und das Schneiden von Hühnerfleisch auf einem Brett, das auch für Salat verwendet wird, kann zu einer Kreuzkontamination beitragen. Eier werden vor allem mit *Salmonellen* in Verbindung gebracht, und der Verzehr von Teig, der unerhitzte Eier enthält, kann ein Risiko für eine Infektion darstellen.

Die Daten wurden zwischen November 2021 und März 2022 mittels einer Online-Umfrage erhoben. In Österreich nahmen 67 Personen teil, in Schweden 65. Das Studienkollektiv bestand hauptsächlich aus Frauen, das Durchschnittsalter lag bei 35 Jahren, und die Mehrheit hatte einen Bachelor- oder Master-Abschluss.
Ziel war es, die Faktoren zu untersuchen, die das Verhalten beeinflussen, und auch die sozialen Unterschiede zwischen den Ländern zu erforschen.

Der größte Unterschied im sozialen Bereich wurde bei der Gleichstellung der Geschlechter festgestellt. Sie ist in der schwedischen Gesellschaft tief verwurzelt und

kann in der gesamten Gesellschaft beobachtet werden. Schon in der Schule, wird diesem Thema viel Aufmerksamkeit geschenkt wird, und dies setzt sich im ganzen Leben fort. In Schweden wird die Kindererziehung fast gleichmäßig zwischen den Eltern aufgeteilt, während dies in Österreich nicht der Fall ist: weniger als 5 % der Väter nehmen Vaterschaftsurlaub, während es in Schweden 45 % sind. Dies wirkt sich auch auf den Beschäftigungsstatus aus, wie die Daten zeigen. Die Mehrheit der Frauen in Schweden arbeitet Vollzeit, während in Österreich die Mehrheit in Mutterschaftsurlaub ist.

Die Daten zeigten eine große Wissenslücke bezüglich der richtigen Kühlschranktemperatur. Besonders schlecht war das Wissen darüber in Österreich. Die Hälfte der Teilnehmer gab an, dass 6-8° die richtige Temperatur sei. Besser waren die Kenntnisse in Schweden, wo nur ein Drittel die falsche Antwort gab.
In beiden Ländern wurden auch Hygienemängel festgestellt. Die meisten wechselten die Geschirrtücher nur einmal pro Woche, was bedenklich ist, da Krankheitserreger tagelang in Geschirrtüchern überleben können. Dies erhöht die Gefahr für eine Kreuzkontamination. Die Verwendung eines Thermometers, um zu prüfen, ob das Fleisch die richtige Temperatur hat, war in beiden Ländern nicht sehr wichtig. Dieses Ergebnis ist weit verbreitet und wurde auch in anderen Studien festgestellt.

Ein weiterer großer Unterschied zwischen den beiden Ländern ist das Risikobewusstsein für Eier. In Schweden ist es viel geringer. So dürfen beispielsweise ¾ der schwedischen Kinder rohen Kuchenteig, der Eier enthält, essen, während in Österreich nur die Hälfte der Eltern dies angab. Eier und Fleisch sind in Schweden frei von Salmonellen, da das Land nach einem großen Ausbruch in den 1950er Jahren strenge Kontrollstrategien eingeführt hat.

In Übereinstimmung mit anderen Studien zeigten die Daten, dass das Verhalten nur in sehr geringem Maße durch das Wissen einer Person beeinflusst wird. Die praktische Anwendung des Wissens ist entscheidend für die Schaffung gesunder Koch- und Hygienegewohnheiten in der häuslichen Umgebung. Daher sollte der Schwerpunkt auf der Ausweitung der praktischen Anwendung in Schulen und Universitäten liegen.
Das Verhalten ist komplex und wird unter anderem von der Einstellung und der persönlichen Risikowahrnehmung einer Person beeinflusst. Diese These unterstreicht

die Notwendigkeit, das Bewusstsein für die möglichen Risiken im häuslichen Umfeld zu schärfen.

Es ist wichtig, werdende Eltern aufzuklären und sie für die potenziellen Gesundheitsrisiken zu sensibilisieren, die zu Hause auftreten können. Viele Krankheitsausbrüche können durch einfache Maßnahmen wie angemessenes Erhitzen, Kühlen und gute Hygiene vermieden werden.

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9. Appendix

9.1. Questionnaire: English version

SECTION 1: Food safety survey

Dear participant!

Thank you very much for taking the time to support me in my Master's Thesis!
My name is Anna Gugl, and I am studying Nutrition Science at the University of Vienna. I am currently in Uppsala (Sweden) to write my Master's Thesis. In cooperation with the two universities (Vienna and Uppsala) I am researching how families with small children handle the topic of food safety.

This survey is **exclusively** intended for those who eat a **mixed diet, not vegetarians or vegans**, and who have **at least 1 child under the age of 5** living in their household (stepchildren included).

Your participation in this study is completely voluntary. You have the right to withdraw your participation at any time and without giving reasons. Refusal to participate or early withdrawal from the study will not result in any adverse consequences for you.
The survey takes approximately 10 minutes to complete. All data will be collected anonymously and will be used for research purposes within the framework of my master´s thesis and a subsequent scientific publication.

If you have any questions or comments you´re welcome to contact me via email at a01619473@unet.univie.ac.at.

Thank you and all the best,
Anna Gugl, BSc

1) I have read the text above and agree to participate.
- Yes
- No

2) I´m not a vegetarian/vegan and I have at least 1 child under the age of 5. (stepchildren included).
- True
- False

1

SECTION 2: Demography 1/2

Here we just ask some basic question about your person.

3) How old are you? (in years)
- .....

4) What gender do you identify as?
- Woman
- Man
- Other

5) What is your postal code? (Please indicate numbers only)
- .....

6) What is your highest completed level of education? (If currently studying- select the last completed)

English:
- Grade school
- Upper secondary school
- University (Undergraduate level/Graduate level)
- PhD
- Other: .....

For Sweden:
- Grundskola
- Gymnasium
- Universitet (Grundnivå/avancerad nivå)
- Doktorsgrad
- Other: .....

For Austria:
- AHS-Unterstufe/ Neue Mittelschule/ Hauptschule
- AHS-Oberstufe / Berufsbildende höhere Schule (BHS) / Berufsbildende mittlere Schule (BMS) / Berufsschule / Polytechnische Schule / Berufsschule (Lehrabschluss)
- University degree (bachelor / master)
- PhD
- Other: .....

7) What is your marital status?
- Married or with a partner -> to section 4
- Single/Separated/Divorced/ Widowed -> to section 3

2

SECTION 3: Main residence of the children

8) The child/children live most of the week:
- At home with me
- With my ex-partner
- Other: .....

SECTION 4: Demography 2/2

9) What is your current employment status?
- Employed full-time -> to section 5
- Employed part-time -> to section 5
- Self-employed -> to section 5
- Maternity leave -> to section 6
- Sick leave -> to section 6
- Student -> to section 5
- Unemployed -> to section 6
- Retired -> to section 6

SECTION 5: Worktime from home

10) Because of COVID-19, approximately what percentage of your work is done from home?
- 0%
- 25%
- 50%
- 75%
- 100%

SECTION 6: Children

11) How many children <6 months live in your household? (please write in numbers) .....
12) How many children >6 - 12 months live in your household? (please write in numbers) .....
13) How many children >12 - 24 months live in your household? (please write in numbers) .....
14) How many children >24 months – 5 years live in your household? (please write in numbers) .....

3

SECTION 7: General food safety information

15) Have you ever received food safety advice concerning pathogenic bacteria from any of the below-mentioned sources?
Multiple selections allowed *(checkbox)*
- Nurse/doctor
- Midwife
- Dietitian/nutritionist
- None of the above

16) Have you experienced food poisoning over the last year?
- Yes
- No
- I do not know

17) Have any of your children/stepchildren experienced food poisoning over the last year?
- Yes
- No
- I do not know

18) From where did you gain your current knowledge of food safety.
List the extent of influence from "Nothing" to "Very high degree".
- A course at school/university:
- Family, friends:
- Social media:
- A visit with a dietitian/nutritionist:
- Cooking classes/TV-shows:
- Cookbooks:

Likert Skala: Nothing / very little degree/ Little degree/ Neither little nor high degree / High degree /Very high degree

19) Do/Did you work in a food company and get your knowledge from there?
Yes
No

20) If there is another source where you get your knowledge from, please indicate it briefly. *(question not required)*
.....

4

SECTION 8: Knowledge 1/2

Please refrain from looking up the answers (e.g. via the internet etc.). If you are not sure which answer is correct then please select "I don't know" instead of guessing.

21) In your country, which kind of pathogenic (=disease-causing) bacteria in particular do you associate with the following raw animal products? (just select 1)

Raw chicken	○ *Bacillus cereus* ○ *Campylobacter jejuni* ○ *Clostridium botulinum* ○ *Clostridium perfringens* ○ *E.coli (EHEC)* ○ *Listeria monocytogenes* ○ *Salmonella* ○ *Shigella* ○ *Staphylococcus aureus* ○ *Yersinia enterocolitica* ○ I don't associate it with any pathogenic bacteria.
Raw ground beef	
Raw eggs	

22) Healthy people may carry the bacteria *"Staphylococcus aureus"* in their nose that can cause foodborne illnesses.

23) Pathogenic bacteria can cause death among humans.

24) Washing raw chicken in the sink is a good way to reduce the risk of an infection with the bacterium "Campylobacter".

25) Tasting the seasoning of raw ground beef puts one at risk for foodborne illnesses.

SECTION 9: Knowledge 2/2

26) Food that is heated to 60°C is totally free of pathogenic (=disease-causing) bacteria.

27) Food that is heated in the microwave is totally free from pathogenic (=disease-causing) bacteria.

28) Freezing food kills any bacteria that could cause food poisoning

29) Bacteria can grow in vacuum-packed food.

30) A dishcloth may spread bacteria that can cause foodborne illnesses.

Answer options:
- ○ *True*
- ○ *False*
- ○ *I don´t know*

31) The optimal refrigerator temperature is
- ○ 2-5 degrees
- ○ 6-8 degrees
- ○ I don´t know

SECTION 10 Behavior

Now we are going to ask you some questions about your behavior.

32) How do you prepare raw chicken and/or raw ground beef?

When preparing raw chicken, I use a thermometer to check if it's done.	○ Never ○ Rarely ○ Sometimes ○ Often ○ Always ○ I never prepare it.
When preparing raw ground beef, I use a thermometer to check if it's done.	
I use different cutting boards when preparing raw chicken and salad ingredients.	

33) Do you occasionally eat raw cake/biscuit dough containing eggs?
- ○ Yes
- ○ No

34) Do you occasionally let your child/children eat raw cake/biscuit dough containing eggs?
- ○ Yes
- ○ No

35) Do you occasionally taste the seasoning of raw ground beef before cooking it?
- ○ Yes
- ○ No

36) Do you occasionally let your child/children taste the seasoning of raw ground beef before cooking it?
- ○ Yes
- ○ No

37) I replace used dishcloths with clean ones (boiled/washed at 60 °C).
- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Rarer

38) I check the temperature in my refrigerator with an external thermometer (one like on the picture) Not with the built-in thermometer; not by checking the display on the fridge
- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Rarer

SECTION 11: Attitude

39) For me, using a thermometer when preparing raw chicken to check if it is done is

40) For me, using a thermometer when preparing raw ground beef to check if it's done is

41) For me, avoiding raw eggs, e.g. not tasting raw cake/biscuit dough, is

42) For me, using different cutting boards when preparing raw animal products and salad/cooked food is

43) For me, replacing used dishcloths with clean ones daily (boiling/washing at 60°C) is

44) For me, checking the refrigerator temperature with an external thermometer (not the built-in thermometer) on a regular basis is

45) For me, cleaning the refrigerator once a month is

Answer options:

	1	2	3	4	5	
Not important	O	O	O	O	O	Very important

SECTION 12 Feedback

Is there anything you would like to tell me?
I am grateful for any feedback. :-)

SECTION 13 The End

Thank you for taking the time! Best wishes, Anna

9.2. Questionnaire: German version

SECTION 1: Umfrage zur Lebensmittelsicherheit

Liebe Teilnehmerin, Lieber Teilnehmer!

Herzlich Willkommen und vielen Dank, dass Sie sich die Zeit nehmen, mich bei meiner Masterarbeit zu unterstützen!

Mein Name ist Anna Gugl und ich studiere Ernährungswissenschaften an der Universität Wien. Zurzeit befinde ich mich zum Verfassen meiner Masterarbeit in Uppsala (Schweden). In Kooperation mit den beiden Universitäten (Wien und Uppsala) beschäftige ich mich mit der Thematik der Ernährungssicherheit bei Familien mit Kleinkindern.
Der Fragebogen richtet sich **ausschließlich** an Personen, die sich **mischköstlich** ernähren - **NICHT** an **Vegetarier** oder **Veganer - und** in deren Haushalt **mindestens 1 Kind unter 5 Jahren** lebt (es ist egal, ob es sich um Ihr/e eigenes/n Kind/er und/oder Stiefkind/er handelt).

Ihre Teilnahme an dieser Studie erfolgt freiwillig. Ihnen bleibt das Recht vorbehalten, den Fragebogen - ohne Angaben von Gründen - jederzeit abzubrechen. Die Ablehnung der Teilnahme oder ein vorzeitiges Ausscheiden aus dieser Studie hat keine nachteiligen Folgen für Sie.
Die Befragung wird in etwa 10 Minuten in Anspruch nehmen. Die Daten werden anonym erfasst und ausschließlich für Forschungszwecke im Rahmen meiner Masterarbeit und einer darauf anschließenden wissenschaftlichen Veröffentlichung verwendet.

Bei Fragen oder Anmerkungen können Sie mich gerne per Mail unter a01619473@unet.univie.ac.at kontaktieren.

Ich bedanke mich für Ihre Mithilfe

Anna Gugl, BSc

1) Ich habe den oben angeführten Text gelesen und bin mit der Teilnahme einverstanden.
- Ja
- Nein

2) Ich ernähre mich nicht vegetarisch/vegan und habe mindestens 1 Kind unter 5 Jahren (Stiefkinder inklusive).
- Stimmt
- Falsch

SECTION 2: Demografische Fragen 1/2

Hier stellen wir nur einige grundlegende Fragen zu Ihrer Person.

3) Bitte geben Sie ihr Alter an. (in Jahren)
- .....

4) Welches Geschlecht haben Sie?
- Weiblich
- Männlich
- Divers

5) Wie lautet Ihre Postleitzahl? (Bitte nur Zahlen angeben. z.B. "1010"; "5020"; ...)
- .....

6) Was ist Ihr höchster Schul- oder Hochschulabschluss? (Falls Sie derzeit auf einer Universität eingeschrieben sind, geben Sie bitte die höchste abgeschlossene Ausbildung an.)
- AHS-Unterstufe/ Neue Mittelschule/ Hauptschule
- AHS-Oberstufe / Berufsbildende höhere Schule (BHS) / Berufsbildende mittlere Schule (BMS) / Berufsschule / Polytechnische Schule / Berufsschule (Lehrabschluss)
- Universitätsabschluss (Bachelor/Master)
- Universitätsabschluss (Doktorrat)
- Other: .....

7) Was ist Ihr Familienstand?
- Verheiratet oder in einer Lebenspartnerschaft -> to section 4
- Ledig/getrennt/geschieden/verwitwet -> to section 3

SECTION 3: Hauptwohnsitz der Kinder

8) Das Kind/die Kinder lebt/leben den überwiegenden Teil der Woche:
- Bei mir zu Hause
- Bei meinem Ex-Partner
- Other: .....

SECTION 4: Demografische Fragen 2/2

9) Was ist Ihr derzeitiger Beschäftigungsstatus?
- Vollzeit erwerbstätig -> to section 5
- Teilzeit erwerbstätig -> to section 5
- Selbstständig -> to section 5
- Karenz -> to section 6
- Krankenstand -> to section 6
- Studierend -> to section 5
- Arbeitslos -> to section 6
- Pensioniert -> to section 6

SECTION 5: Arbeitszeiten von zu Hause aus

10) Aufgrund von COVID-19, wie viel Prozent arbeiten Sie ungefähr von zu Hause aus?
- 0%
- 25%
- 50%
- 75%
- 100%

SECTION 6: Kinder

11) Wie viele Kinder <6 Monate leben in Ihrem Haushalt? (bitte in Ziffern schreiben) .....

12) Wie viele Kinder >6 – 12 Monate leben in Ihrem Haushalt? (bitte in Ziffern schreiben) .....

13) Wie viele Kinder >12 – 24 Monate leben in Ihrem Haushalt? (bitte in Ziffern schreiben) .....

14) Wie viele Kinder >24 Monate – 5 Jahre leben in Ihrem Haushalt? (bitte in Ziffern schreiben) .....

SECTION 7: Allgemeine Informationen zur Lebensmittelsicherheit

15) Haben Sie jemals von einer der unten genannten Quellen Ratschläge zur Lebensmittelsicherheit in Bezug auf pathogene (=krankmachende) Bakterien erhalten? (Mehrfachnennungen möglich)
- Krankenschwester/Arzt
- Hebamme
- Diätassistent/Ernährungsberater
- Keiner der Genannten

16) Hatten Sie im vergangenen Jahr eine Lebensmittelvergiftung?
- Ja
- Nein
- Weiß nicht

17) Hatte eines Ihrer Kinder/Stiefkinder im vergangenen Jahr eine Lebensmittelvergiftung?
- Ja
- Nein
- Weiß nicht

18) Woher stammt Ihr derzeitiges Wissen in Bezug auf Lebensmittelsicherheit?
Führen Sie den Einflussgrad von „gar nichts" bis „sehr viel" an.
- Kurs an Schule/Universität:
- Familie, Freunde:
- Soziale Medien:
- Besuch bei einem Ernährungsberater/Diätassistenten:
- Kochkurse/Fernsehen:
- Kochbücher:

Likert Skala: Gar nichts / sehr wenig/ Wenig / weder wenig noch viel / ziemlich viel / sehr viel

19) Arbeiten Sie oder haben Sie in einem Lebensmittelunternehmen gearbeitet und beziehen ihr Wissen von dort?
- Ja
- Nein

20) Wenn es eine andere Quelle gibt, aus der Sie Ihr Wissen beziehen, geben Sie diese bitte kurz an. *(question not required)*
- .....

SECTION 8 Wissen 1/2

Bitte schlagen Sie die richtigen Antworten nicht nach (z. B. Internet usw.). Wenn Sie sich nicht sicher sind, welche Antwortmöglichkeit richtig ist, wählen Sie bitte "Weiß nicht", anstatt zu raten.

21) Welche Art von pathogenen (=krankmachenden) Bakterien bringen Sie in Ihrem Land insbesondere mit den folgenden rohen tierischen Produkten in Verbindung? (nur 1 Antwortmöglichkeit)

Rohes Hühnerfleisch	○ *Bacillus cereus* ○ *Campylobacter jejuni* ○ *Clostridium botulinum* ○ *Clostridium perfringens* ○ *E.coli (EHEC)* ○ *Listeria monocytogenes* ○ *Salmonella* ○ *Shigella* ○ *Staphylococcus aureus* ○ *Yersinia enterocolitica* ○ Ich bringe es mit keiner Art von pathogenen (=krankmachenden) Bakterien in Verbindung.
Rohes Rinderfaschiertes	
Rohe Eier	

22) Gesunde Menschen können das Bakterium *„Staphylococcus aureus"*, das lebensmittelbedingte Krankheiten verursachen kann, in der Nase tragen.

23) Pathogene Bakterien können beim Menschen zum Tod führen.

24) Das Waschen von rohem Hühnerfleisch im Waschbecken ist eine gute Möglichkeit, das Risiko einer Infektion mit Campylobacter-Bakterien zu verringern.

25) Das Kosten von rohem Rinderfaschierten erhöht das Risiko für lebensmittelbedingte Krankheiten.

SECTION 9: Wissen 2/2

26) Lebensmittel, die auf 60°C erhitzt werden, sind völlig frei von pathogenen (=krankmachenden) Bakterien.

27) Lebensmittel, die in der Mikrowelle erhitzt werden, sind völlig frei von von pathogenen (=krankmachenden) Bakterien.

28) Das Einfrieren von Lebensmitteln tötet alle Bakterien ab, die lebensmittelbedingte Krankheiten verursachen können.

29) Bakterien können sich in vakuumverpackten Lebensmitteln vermehren.

30) Über Geschirrtücher können Bakterien verbreitet werden, die lebensmittelbedingte Krankheiten auslösen können.

Antwortmöglichkeiten:
- ○ *Richtig*
- ○ *Falsch*
- ○ *Weiß nicht*

31) Die optimale Kühlschranktemperatur liegt bei:
- ○ 2-5 Grad
- ○ 6-8 Grad
- ○ Weiß nicht

SECTION 10: Verhalten

Jetzt werden wir Ihnen einige Fragen zu Ihrem Verhalten stellen.

32) Wie bereiten Sie rohes Hühnerfleisch und/oder rohes Rinderfaschiertes zu?

Wenn ich rohes Hühnerfleisch zubereite, verwende ich ein Thermometer, um zu prüfen, ob es gar ist.	○ Nie ○ Selten ○ Manchmal ○ Oft ○ Immer ○ Ich bereite es nie zu.
Wenn ich rohes Rinderfaschiertes zubereite, verwende ich ein Thermometer, um zu prüfen, ob es gar ist.	
Ich verwende verschiedene Schneidebretter, wenn ich rohes Hühnerfleisch und Salatzutaten zubereite.	

33) Kosten Sie gelegentlich rohen Kuchen-/Keksteig, welcher Eier enthält?
- ○ Ja
- ○ Nein

34) Lassen Sie Ihr(e) Kind(er) gelegentlich rohen Kuchen-/Keksteig kosten, welcher Eier enthält?
- ○ Ja
- ○ Nein

35) Kosten Sie gelegentlich rohes Rinderfaschiertes vor dem Braten?
- ○ Ja
- ○ Nein

36) Lassen Sie Ihr Kind/Ihre Kinder gelegentlich rohes Rinderfaschiertes vor dem Braten kosten?
- ○ Ja
- ○ Nein

37) Ich ersetze benutzte Geschirrtücher durch saubere: (auskochen/waschen bei 60 °C).
- ○ Täglich
- ○ Wöchentlich
- ○ Monatlich
- ○ Seltener

38) Ich messe die Temperatur in meinem Kühlschrank mit einem externen Thermometer/Thermoelement. (Beispiel siehe Bild)
(Nicht mit einem eingebauten Thermometer bzw nicht durch die Kontrolle des Displays außen am Kühlschrank.
- ○ Täglich
- ○ Wöchentlich
- ○ Monatlich
- ○ Seltener

SECTION 11: Einstellung

Jetzt werden wir Ihnen einige Fragen zu Ihrer Einstellung stellen.

39) Für mich ist die Verwendung eines Thermometers bei der Zubereitung von rohem Hühnerfleisch, um zu prüfen, ob es gar ist:

40) Für mich ist die Verwendung eines Thermometers bei der Zubereitung von rohem Rinderfaschiertem, um zu prüfen, ob es gar ist:

41) Der Verzicht auf rohe Eier, z. B. durch den Verzicht des Verzehrs von rohem Kuchen-/Keksteig, ist für mich

42) Für mich ist die Verwendung getrennter Schneidebretter beim Umgang mit tierischen Rohprodukten und Salat/gekochten Lebensmitteln

43) Für mich ist das tägliche Ersetzen eines benutzten Geschirrtuchs durch ein sauberes (auskochen/waschen bei 60 °C)

44) Für mich ist das regelmäßige Messen der Temperatur mit einem externen Thermometer in meinem Kühlschrank (nicht mit dem eingebauten Thermometer im Kühlschrank)

45) Für mich ist das Reinigen des Kühlschranks 1x im Monat

Antwortmöglichkeit:

	1	2	3	4	5	
Nicht wichtig	O	O	O	O	O	Sehr wichtig

SECTION 12 Feedback

Gibt es irgendetwas, das Sie mir sagen möchten?
Ich bin für jedes Feedback dankbar!

SECTION 13 Ende

Danke, dass Sie sich die Zeit genommen haben! Herzliche Grüße, Anna

9.3. Questionnaire: Swedish version

SECTION 1: Enkät om livsmedelssäkerhet

Bästa deltagare!

Välkommen och tack för att du tar dig tid att stödja mig i mitt masterarbete!

Mitt namn är Anna Gugl och jag studerar nutrition vid Wiens universitet. För närvarande skriver jag min masteruppsats i Uppsala i samarbete med båda universiteten (Wien och Uppsala). Jag arbetar med ämnet livsmedelssäkerhet bland familjer med små barn.
Enkäten är exklusivt ämnad till personer som äter **blandkost, som varken är vegetarianer eller veganer** och som har **minst ett barn som är yngre 5 år** i hushållet (även bonusbarn).

Ditt deltagande i den här studien är helt frivilligt. Du har rätt att när som helst avbryta ditt deltagande utan att behöva ange varför. Att vägra deltagande eller att tidigt avbryta kommer inte att ge några som helst negativa konsekvenser för dig.

Enkäten tar ca 10 minuter att besvara. All data som samlas in via denna enkät kommer att hanteras konfidentiellt och är tänkt användas i forskningssyfte inom ramen för min masteruppsats och framtida vetenskaplig publiceringsprocess.
Om du har några frågor eller kommentarer är du välkommen att kontakta mig via e-mail på adress: **a01619473@unet.univie.ac.at.**

Stort tack för din hjälp!

Anna Gugl, BSc

1) Jag har läst ovanstående text och samtycker till att delta.
- Ja
- Nej

2) I´m not a vegetarian/vegan and I have at least 1 child under the age of 5. (stepchildren included) Jag är inte vegetarian/vegan och har åtminstone 1 barn under 5 år (bonusbarn inkluderat)
- Sant
- Falskt

SECTION 2: Demografi 1/2

Nedan finns några frågor om dig.

3) Hur gammal är du? (antal år)
- .....

4) Ange det kön du själv definierar dig som.
- Kvinna
- Man
- Annat

5) Var bor du? Ange ditt postnummer nedan. (Ange bara numret utan mellanrum)
- .....

6) Vad är din högsta avslutade utbildning? (Om pågående studier- välj senast avslutade)
- Grundskola
- Gymnasium
- Universitet (Grundnivå/avancerad nivå)
- Doktorsgrad
- Other: .....

7) Vad är ditt civilstånd?
- Gift eller samboende -> to section 4
- Singel/Separerad/skild/ änka -> to section 3

SECTION 3: Barnens huvudsakliga boende

8) Barnet/barnen bor större delen av veckan:
- Hos mig
- Hos min expartner
- Other: .....

SECTION 4: Demografi 2/2

9) Vad är din nuvarande position?
- Heltidsarbetande -> to section 5
- Deltidsarbetande -> to section 5
- Egenföretagare -> to section 5
- Föräldraledig -> to section 6
- Sjukskriven -> to section 6
- Studerande -> to section 5
- Arbetssökande -> to section 6
- Pensionerad -> to section 6

SECTION 5: Del av arbetstiden som är förlagd i bostaden

10) På grund av COVID-19, ungefär hur många procent arbetar du hemifrån?
- 0%
- 25%
- 50%
- 75%
- 100%

SECTION 6: Barn

11) Hur många barn <6 månader bor i ditt hushåll? (skriv antalet) .....
12) Hur många barn >6-12 månader bor i ditt hushåll (skriv antalet) .....
13) Hur många barn >12-24 månader bor i ditt hushåll? (skriv antalet) .....
14) Hur många barn > 24 månader – 5 år bor i ditt hushåll? (skriv antalet) .....

SECTION 7: Generell information om livsmedelssäkerhet

15) Har du någon gång erhållit råd om livsmedelssäkerhet från någon av nedanstående källa? (Flera svar möjliga)
- Sjuksköterska/läkare
- Barnmorska
- Dietist/Nutritionist
- Ingen av dem

16) Har du blivit matförgiftad efter att ha ätit mat under det senaste året?
- Ja
- Nej
- Vet inte

17) Har något/några av dina barn blivit matförgiftad efter att ha ätit mat under det senaste året?
- Ja
- Nej
- Vet inte

18) Från vilken källa har du fått din nuvarande kunskap om livsmedelssäkerhet?
- Tagit en kurs på grundskola/gymnasium/universitet
- Familj och vänner:
- Social media:
- Från besök hos dietist/nutritionist:
- Matlagningskurs/TV-shows:
- Kokböcker:

Likert Skala: Ingenting / I väldigt liten grad / I liten grad / Varken liten eller hög grad / i hög grad / I väldigt hög grad

19) Arbetar du/har du arbetat på ett livsmedelsföretag
- Ja
- Nej

20) Om där finns någon annan källa till kunskap om livsmedelssäkerhet, ange detta kortfattat *(question not required)*
- .....

Section 8: Kunskap 1/2

Tack för att du inte tar reda på svaren (t.ex. via internet). Om du är osäker, svara hellre; "Jag vet inte".

21) I ditt land, vilken typ av patogena (=sjukdomsframkallande) bakterier associerar du särskilt till följande råa, animala livsmedel? (Välj endast en)

rå kyckling	○ *Bacillus cereus* ○ *Campylobacter jejuni* ○ *Clostridium botulinum* ○ *Clostridium perfringens* ○ *E.coli (EHEC)* ○ *Listeria monocytogenes* ○ *Salmonella* ○ *Shigella* ○ *Staphylococcus aureus* ○ *Yersinia enterocolitica* ○ Jag associerar inte till någon patogen bakterie
rå nötfärs	
råa ägg	

22) Friska personer kan i näsan bära *"Staphylococcus aureus"*, som kan orsaka matförgiftning

23) Patogena bakterier kan orsaka död hos människor.

24) Att tvätta rå kyckling i vasken är ett bra sätt att reducera risken för infektion med Campylobacter

25) Att provsmaka rå nötfärs ä ren risk för matförgiftning

Section 9: Kunskap 2/2

26) Mat som är upphettad till 60°C är totalt fri från patogener (=bakterier som gör dig sjuk).

27) Mat som värms upp i mikron är totalt fri från patogener (=bakterier som gör dig sjuk).

28) Att frysa mat dödar alla bakterier som skulle kunna orsaka matförgiftning

29) Bakterier kan tillväxa i vacuumförpackningar

30) En disktrasa kan sprida bakterier som orsakar matförgiftning

Answer options:
- ○ Sant
- ○ Falskt
- ○ Jag vet inte

31) En optimal kyltemperatur är
- ○ 2-5 °C
- ○ 6-8 °C
- ○ Jag vet inte

SECTION 10: Beteende

N kommer vi att ställa några frågor om ditt beteende.

32) Hur hanterar du rå kyckling och/eller rå köttfärs av nöt?

När jag tillagar rå kyckling använder jag en termometer för att se om den är klar.	○ Aldrig ○ Sällan ○ Ibland ○ Ofta ○ Alltid ○ Jag hanterar det aldrig.
När jag tillagar rå köttfärs av nöt använder jag en termometer för att se om den är klar.	
När jag lagar mat använder jag separata skärbrädor för att skära rå kyckling/ rå nötfärs och salladsingredienser.	

33) Händer det att du provsmakar kaksmeten som innehåller råa ägg?
- ○ Ja
- ○ Nej

34) Händer det att du låter ditt barn/barnen få smaka på kaksmeten som innehåller råa ägg?
- ○ Ja
- ○ Nej

35) Händer det att du provsmakar rå köttfärs av nöt innan tillagningen?
- ○ Ja
- ○ Nej

36) Händer det att du låter ditt barn/barnen provsmaka rå köttfärs av nöt innan tillagningen?
- ○ Ja
- ○ Nej

37) Jag ersätter använd disktrasa med en ren (kokar den/tvättar den vid 60 °C).
- ○ Dagligen
- ○ En gång i veckan
- ○ En gang i månaden
- ○ En gång i månaden eller mer sällan

38) Jag mäter temperaturen i mitt kylskåp med en extern termometer/termoelement (se exemplet på bild), inte den inbyggda termometern som visar temperaturen utanpå mitt kylskåp.
- ○ Dagligen
- ○ En gång i veckan
- ○ En gang i månaden
- ○ En gång i månaden eller mer sällan

SECTION11: Attityd

Nu skulle vi vilja få veta lite mer om din inställning.

39) Att använda en termometer vid tillagning av rå kyckling för att kontrollera om den är färdig är för mig:

40) Att använda en termometer vid tillagning av rå nötfärs för att kontrollera om den färdig är för mig:

41) Att inte konsumera råa ägg, till exempel genom att inte provsmaka en sockerkakssmet, är för mig:

42) Att använda separate skärbrädor vid hantering av råa animaliska livsmedel och sallad/tillagad mat är för mig:

43) Att dagligen byta från använd disktrasa till en ren (koka/tvätta vid 60 °C) är:

44) Att regelbundet mäta temperaturen i mitt kylskåp (inte den inbyggda termometer som visar kylskåpstemperaturen) är för mig:

45) Att rengöra kylskåpet regelbundet är för mig:

Answer options:

	1	2	3	4	5	
Väldigt viktigt	0	0	0	0	0	Inte viktigt

SECTION 12 Feedback

Is there anything you would like to tell me? Är det någonting du vill berätta för mig?

SECTION 13 The End Slut på enkäten

Tack för att du tagit dig tid!
Bästa hälsningar! Anna

9.4. Ethical approval – Austria

Beschluss der Ethikkommission
Decision of the Ethics Committee

universität wien
Ethikkommission

Antragsteller*in / Applicant: **Ass.-Prof. Mag. Dr. Petra Rust**
Bearbeitungsnummer / Reference Number: **00757**
Projekttitel / Title of Project: **Umfrage zur Lebensmittelsicherheit bei Familien mit Kindern unter 5 Jahren, die sich omnivor ernähren**

Die Stellungnahme der Ethikkommission erfolgt aufgrund folgender eingereichter Unterlagen / The decision of the Ethics Committee is based on the following documents:

16.11.2021
- Anschreiben Eltern_Erziehungsberechtigte_Lebensmittelsicherheit
- Antragsformular_Lebensmittelsicherheit
- Englisch_Questionnaire_Lebensmittelsicherheit
- German_Questionnaire_Lebensmittelsicherheit
- Schwedisch_Questionnaire_Lebensmittelsicherheit
- Text für soziale Medien_Lebensmittelsicherheit

10.02.2022
- Antragsformular_00757_Umfrage zur Ernährungssicherheit bei Familien mit Kindern unter 5 Jahren, die sich omnivor ernähren
- CoverLetter_00757 - Umfrage zur Ernährungssicherheit bei Familien mit Kindern unter 5 Jahren, die sich omnivor ernähren.docx
- CoverLetter_00757 - Umfrage zur Ernährungssicherheit bei Familien mit Kindern unter 5 Jahren, die sich omnivor ernähren.docx(1)
- Q_german_00757_Umfrage zur Ernährungssicherheit bei Familien mit Kindern unter 5 Jahren, die sich omnivor ernähren

Die Kommission fasst folgenden Beschluss (mit X markiert) / The Ethics Committee has made the following decision (marked with an X):

☒ Zustimmung: Es besteht kein ethischer Einwand gegen die Durchführung der Studien. / Consent: There is no ethical objection to conduct the study as proposed.

☐ Negative Beurteilung: Der Antrag wird von der Ethikkommission abgelehnt. / Negative evaluation: The proposal is rejected by the Ethics Committee.

Inhaltliche Abänderungen müssen der Ethikkommission vorgelegt werden. / Amendments to the content must be presented to the Ethics Committee.

Unterschrift / Signature

Datum / Date

14.02.2022

Vorsitzender der Ethikkommission / Chair of the Ethics Committee
Univ.-Prof. MMag. DDDr. Martin Voracek