

**SOUTH AFRICAN CONSUMERS PERCEPTIONS TOWARDS READY-  
TO-EAT MEAT PRODUCTS AFTER 2017-2018 LISTERIOSIS OUT-  
BREAK**

**LITERATURE REVIEW**

**by**

**Ennet Moholisa**

**MEAT SCIENCE AND TECHNOLOGY SECTION  
DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY  
AGRICULTURAL RESEARCH COUNCIL-ANIMAL  
PRODUCTION  
IRENE**

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## **ABSTRACT**

This review explores the consumers perceptions towards food safety of ready-to-eat (RTE) meat products, in particular, after foodborne illness out-break. The recent South African listeriosis out-break in the RTE meat products necessitated the investigation into this matter. Food scares reduces consumers confidence of the implicated products thereby reducing the demand. As a result, this review focus on the factors that influence consumer demand for RTE meats, as well as the challenges affecting RTE meat demands. Lastly, previous research empirical findings on consumer perceptions on food safety after the occurrence of foodborne out-break/food scare are presented. Understanding consumer views following a food scare is critical for restoring and maintaining consumer trust in the food supply chain.

## **INTRODUCTION**

Perception is described as the process through which an individual select, organizes and interprets the information he receives in order to do something that makes sense. The perception of a situation at a given time may decide if and how the person will act (Rani, 2014). Consumers perceptions towards meat in general are believed to be complex and depend on multiple interacting factors, such as appearance and sensory properties (flavour, odour, in-mouth texture), psychological (lifestyle and values, expectations, socio-cultural effect, demographics, attitudes/believes) and marketing aspects (price, label, brand, availability, commercials) (Font-i-furnols & Guerrero, 2014). In addition, health and food safety issues influence consumers perceptions regarding food products. Consumers have become increasingly concerned about foodborne risks and personal health (Van Wezemael, Verbeke, De Barcellos, Scholderer, & Perez-Cueto, 2010) in particular, towards meat and processed meat products consumption. There have been numerous occurrences of foodborne illness out-breaks resulting from the consumption of meat and meat-products all over the world (Gilbert et al., 2009; Zhang et al., 2016; Kurpas, Wiczorek, & Osek, 2018). As a result, meat production and consumption have been under heavy criticisms. Amongst all meats, ready-to-eat (RTE) have come under increasing scrutiny by food safety agencies, academics and consumer groups due to their associations established between them and foodborne out-breaks.

Ready-to-eat meats are products whose processing includes one or more pathogen control steps to render the products safe for consumption without further processing/cooking by the consumer. These include red meat, pork, lamb, poultry or mixed species products

(Gilbert et al., 2009). Types of processed RTE meats include raw cured shelf stable meats (raw ham, salami, fermented sausages, biltong, etc), cooked perishable uncured meats (roast beef and other cooked meats not reheated before consumption) and cooked perishable cured meats (cooked ham, pastrami, silverside, corned beef, frankfurters, etc. The RTE meat production chain comprises of farms, slaughterhouses, manufactures, shops, restaurants, and transport of products between these places. In each step of this food chain there are different possible sources of contamination by foodborne illness-causing pathogens (Kurpas et al., 2018). Most studies based on the “farm to fork” concept have shown that contamination of the final products usually occurs in processing plants or at the retail level and less often directly from food-producing animals. Furthermore, human factor may be vectors of contamination. Employees who do not comply with proper hygiene rules may cause contamination in the retail store (Kurpas et al., 2018). Many empirical studies have also identified that consumers often engage in unsafe food handling practices at home (Redmond & Griffith, 2004; Evans & Redmond, 2016; Tsigarida, Gaitis, Garofalakis, & Papanastasiou, 2019).

Although there are many foodborne illness-causing pathogens associated with RTE meats, *Listeria monocytogenes* is at the top of the RTE meat manufacturer’s list of concerns. In the production chain steps, RTE meats are vulnerable to contamination with bacterium *Listeria monocytogenes*. Several studies have shown that different kinds of RTE foods of animal origin are a vehicle for transmission of *Listeria monocytogenes* to consumers (Kurpas et al., 2018; Zhang et al., 2016; Gilbert et al., 2009). This pathogenic bacterium causes listeriosis. Listeriosis is a serious infection usually caused by eating food contaminated with *Listeria monocytogenes* (Gilbert et al., 2009; Zhang et al., 2016; Kurpas et al., 2018). *Listeria monocytogenes* known to pose a serious illness risk for immune compromised individuals, the elderly, pregnant women and children, and that it can also cause foodborne illness in those with healthy immune systems. Furthermore, this bacterium is a very difficult pathogen to control in the food processing environment because it can grow in refrigerated temperatures and find harbourage points in many areas within a facility and on many types of surfaces (Gilbert et al., 2009; Kurpas et al., 2018).

There has been many listeriosis reported out-breaks in many countries (Kurpas, et al., 2018), and South Africa (SA) is no exception (Olanya et al., 2019; Tchatchouang et al., 2020). According to the South African National Institute for Communicable Diseases (NICD, 2016) the first documented out-break of listeriosis in SA was between August 1977 to April 1978 and 14 cases were reported in Johannesburg. Prior to 2017, an average of 60 to 80 laboratory-

confirmed listeriosis cases per year (approximately 1 per week), were reported in SA (NICD, 2018). In July 2017, an increase in laboratory-confirmed cases of listeriosis were reported to NICD which was followed by investigations into the reported increase. In December 2017, the listeriosis out-break was declared by the Minister of Health. According to World Health Organisation (WHO) (2018), that was the world's largest documented out-break of its kind. The source of the out-break was identified as the RTE processed meat products. It was traced back from two major brands factories manufacturing polony, the RTE meat product. Polony is the RTE meat product made from finely ground meat emulsion. It is made of pork, other meats, fat and spices, then stuffed into a casing. Traditional polony is dyed bright pink and is a popular South African sandwich meat as it is one of the few deli meats that is economically accessible to the poor (Boatema et al., 2019). Approximately 190 food processing facilities that manufacture processed RTE meats were implicated in the listeriosis out-break. In March 2018, a recall of affected products was initiated. After the recall of implicated products, the number of cases were reported to have gone down (NICD, 2018). The last known case of listeriosis was identified in the first week of June 2018 and the listeriosis out-break was declared over by the Minister of Health (WHO, 2018). However, there were suspicions that while major implicated products and brands had been removed from the shelves, some tainted products remained in the food system. The research study group from the University of Pretoria revealed that *listeria* had been found in other food products that were not identified during the initial out-break. These were RTE meat products not manufactured by the two major brands RTE meat factories that were identified as a probable source of this out-break. It was anticipated that cases could still be reported. This could be due to the fact that; the incubation period of listeriosis can be up to 70 days, the implicated products have a long shelf-life and that despite the recall, it was possible that some products could have not been removed from retail or consumers homes, and that cross-contamination at retail and in the home could occur (Pillay, 2018). More than 200 people were reported to have died as a result of the listeriosis out-break (NICD, 2018). The out-break was highly publicised. Highly publicised foodborne out-breaks affect consumer perceptions leading to changes in food purchasing patterns, consequently food product demand.

Consumer perceptions towards food safety are influenced by risk perceptions. According to Brady, Li and Brown (2009), measurement of food safety risk can be approached in two ways. The first would be technical approach. This approach attempts to assign probabilities of negative events in an objective, research-based, and value-free way. The second

one is the social process approach. The social approach recognises that perceived probabilities are the result of public discourse, political conditions, and the economic environment surrounding events. In the case of listeriosis out-break 2017-2018 in SA, a technical approach was commonly used. Most of the work done at the time focused on pathogen-specific approaches which had targeted distinct areas of the food chain such as the production area (Smith et al., 2019; Keet, 2020; Thomas et al., 2020). Other studies focused on food safety practices in the food retail industry, economic impact (Olanya et al., 2019) and the regulations and structure of food safety governance (Boatemaa et al., 2019; Gordan, 2019). To lesser extent, social process approach was used to investigate the listeriosis out-break, studies included consumption patterns (Dikgole, Luvhengo, & Lekunze, 2019) and asymmetry in food safety information dynamics (Louw & Van der Merwe, 2020). Although it might be preferable for policy makers to base their judgements on a purely technical basis, the truth is that perceptions are more often important to decision making, particularly when it comes to food safety decisions. Considering that public evaluations of risk and acceptability differ from expert risk judgments. The consumer reactions to food-related hazards cannot be predicted by relying on technical risk assessments made by experts. Therefore, understanding consumer responses to various food safety issues is crucial if effective food safety policy and risk communication are to be developed and implemented (Frewer, Jonge, & Kleef, 2008). The consumer response in the market determines product success because, in the end, consumers' perception of risk—rather than the perception of objective, technical risk—directly affects consumer choices and market demand (Mccluskey, Kalaitzandonakes, & Swinnen, 2016).

This literature review seeks to address consumers perceptions of food safety related to RTE meats, particularly after foodborne illness out-break. The *listeria* out-break that resulted from the RTE meat products in SA brought this reality into sharp focus with respect to food safety regulatory uncertainties and economic impact shocks that reverberated throughout the meat processing sector in 2017-2018. The consumer perceptions are no less important in unraveling potential longer term implications of the consumer demands of the RTE meats. The review explores how the out-break affected consumer views of food safety in respect to RTE meats, as well as whether these changes were temporary or reflected a deeper shift in consumer perceptions. The meat industry would benefit from understanding the consumers perceptions and focus on better management on both actual and perceived food safety risks in RTE meats. This could help to build and ensure consumers confidence.

## FACTORS DRIVING CONSUMER DEMAND FOR RTE MEATS

Trends indicate that consumption of RTE meats is driven by consumer demands (De Barcellos, Grunert, & Scholderer, 2011; Farouk & Mills, 2017). Consumer demands are categorised into the following;

- Convenience: all components that are related to the kind of effort that is being reduced, i.e. ease of use or readily available. These include; saving time (meal plans, one-stop shopping, eating out, etc.), physical energy (use of kitchen appliances and equipment, pre-cut meat, deboning meat, dish washing, etc.) or mental energy (clear instructions, familiar foods, known store, etc.).
- Less processed: consumers are seeking for less processed meats with fewer ingredients.
- Health: foods that are healthy and perceived to be natural, RTE meats that have reduced salt or sodium, reduced fat and are free from artificial additives.
- Organic foods or country of origin: processed deli meats produced from free range and locally based producers. These meats are perceived to be free from hormones, antibiotics, etc. They are considered authentic.

In response to these demands, different sectors of the food system compete to identify and provide more processed and higher value-added products. Therefore, manufacturers of RTE meats introduced products that carry quality cues. Quality cues are described as the quality expectations that are formed based on the information available on the product before the product is purchased (De Barcellos et al., 2011). This information is found on the product label. Consumers positively perceive food product label as an effective risk communication instrument (Tonkin, Coveney, Meyer, Wilson, & Webb, 2016). They use food product label as a source of information to formulate perceptions about food safety (Schoerder, et al., 2006; Tonkin, et al., 2016; Tiozzo et al., 2017). Manufacturers of RTE meat products have introduced chilled and frozen products with less sodium and fewer ingredients (less processed) in an attempt to attain a clean label. Clean label means making a product using as few ingredients as possible, and making sure those ingredients are items that consumers recognise and think of as wholesome and that consumers might use at home. It seeks out foods with easy-to-recognise ingredients and no artificial ingredients or synthetic chemicals are used (Velissariou, 2018). The manufacturers have also introduced RTE poultry products varieties as “healthier” alternatives. Other new introductions include processed meat with different flavours and claims

such as “convenient”, “all-natural” and “gluten-free”. Different private label products with premium claims, unique flavouring or other product attributes can also be found in the market as consumers look for affordable RTE products (Fernando, 2017). According to De Barcellos, et al. (2011), building the right quality cues into the product is a major positioning issue and crucial for the success of new processed products in the market.

The Business Wire (2019) indicated that the demand of RTE food in the global market is anticipated to grow on account of increasing working population, growing per capita disposable income, rising per capita expenditure on conventional food, changing taste preferences of people and the change in lifestyle among affluent consumers. The report further stated that the growing urbanisation in developing countries also adds in the rise of the disposable income, which eventually increases the expenditure on easily available multi-flavoured foods thus, creating a huge market for the manufacturer. Moreover, the busy lifestyle of the urban people leads to the increased dependence on RTE foods. This is further aided with the penetration and availability of a wide variety of RTE meat products in different packaging formats at various distribution channels. These are also true with the South African market demand for processed RTE meats. According to Feeley, Pettifor and Norris, (2009), SA is undergoing nutrition transition at a much faster rate than it has occurred in higher income countries and this lead to high consumption of protein filled diets, including RTE meats (Ronquest-Ross, Lisa, Vink, & Sigge, 2015).

In SA, meat consumption has risen drastically. Over the past few years, a steady economic growth and increased average income in SA pushed large numbers of consumers towards protein-filled diets and convenience, and as a result meat consumption levels increased (United State Department of Agriculture-Foreign Agricultural Service (USDA-FAS)Gain report, 2015), so as meat products. The report on food consumption changes in SA highlighted the fact that value-added processed meat consumption has increased since 1994 (Ronquest-Ross et al., 2015). In 2016 the South African consumers spent approximately R205 billion on meat products, which represented one third of total expenditure on food, while a decade ago South Africans spent R46 billion on meat products, representing only about a quarter of total expenditure on food (USDA-FAS Gain report, 2019). The processed meat market was niche a few years ago, but with an imposition of western lifestyle and improved retail landscape, the market for processed meat in SA expanded. It is expected to witness a compound annual growth rate of 2.3 % in 2018-2023 (Mordor Intellegence, 2015).

The SA producers, retailers and the foodservice sector responded to this increased demand for protein by supplying the market with competitively priced, value-added and convenience products, including RTE meats. These rapid increase of the convenience foods penetrated through the townships and street food vendors where they were well accepted. Most of the RTE meats are sold by street vendors and townships (historically disadvantaged areas in SA) tuckshops known as “spaza” shops include polony, russian and vienna sausages. These RTE meats and other processed meat products are the main ingredients of a popular fast food called ‘quarter’ and known as ‘kota/sephatlo’ or ‘bunny chow’ in the informal food vendors. Quarter is very popular in younger population in SA townships (Feeley et al., 2009). Outlet chains of ‘quarter’ and many other processed meat products emerged. This led to an intensification in the competition across the market. Meat products, such as sausages, nuggets, salami, hotdogs, burger patties, etc. are not only available at the rapidly mushrooming fast food joints in SA’s urban areas but also in malls and other eating outlets (Morder intelligence, 2015). Ready-to-Eat meats have become central to street food and small scale fast food vending in SA (Hunter-Adams, Battersby, & Oni, 2018).

Although there is growing demand for RTE meats, there are also challenges affecting the demand. These include regulatory uncertainties, inadequate infrastructure and food safety issues. Regulations that require the substantiation of nutritional and health claims that hamper new products developments or launching of new RTE meats, especially developing RTE manufactures. Lack of strong supply-chain infrastructure may also impedes development of RTE products in many developing and emerging economies (Farouk & Mills, 2017). These challenges could be perfectly applied to South African context, specifically, the regulatory uncertainties.

Although the South African meat industry is highly regulated, the power of regulatory uncertainties became evident after the listeriosis out-break in 2017-2018. Food safety legislation had to be reviewed (NICD, 2018). A new compulsory specification for processed meat products, known as VC 9100, was published by the Department of Trade and Industry on 08 August 2019 and came into force on 08 October 2019 as a direct result of the out-break. This VC affected all food businesses that handle, prepare, process, package, refrigerate, freeze, chill, label, mark and store heat-treated and RTE processed meat products covered in the scope of South African National Standard (SANS) 885 for processed meats. The implementation of VC led to enforcement of other regulations such as the application of the Hazard Analysis and Critical Control Point System (HACCP) (R.908). The HACCP system designs measures to

reduce food safety risks. The regulation R.908 applies to all RTE heat treated meat and poultry as defined in South African National Accreditation System.

Many other regulations were amended, that included the regulations governing general hygiene for food premises, the transport of food and related matters (R.638) and regulations regarding the classification, packing and marking of processed meat products intended for sale in the Republic of South Africa (R1283). Regulation 638 was the new standard that the Environment Health Practitioners would use for the approval of food premises and issuing of certificate of acceptability. The RTE meats are further regulated under the Foodstuffs Cosmetics and Disinfectants Act. This act governs the labelling and advertising of meat and meat products to ensure that consumers are not misled. In addition, the Consumer Protection Act makes it illegal for consumers to be misled in any way.

These many new regulations were expected to improve the food safety standards if implemented correctly, however, according to Gordan (2019) these new regulations were imposed on the RTE meat industry. As a result, only the strong businesses might survive because the levies, audits and fees that came with the new regulations could have a bad impact at the RTE meat industry. In turn, these costs would be borne by the consumers (Gordan, 2019), as the prices of RTE meats would increase. Furthermore, the enforcement of these new regulations would mean the end of most of the developing RTE meat facilities as they might not be able to meet the minimum requirements i.e. inadequate infrastructure for food safety.

After the listeriosis out-break Boatemaa, et al.(2019), analysed South African food safety policies and practices and concluded that the South African food safety system is too fragmented and lacks interaction within its frameworks, which leads to ineffective legislation and enforcement. This may have a negative impact on consumers confidence and trust in the governments food safety policy regulations.

## **SURVEYS ON CONSUMERS FOOD SAFETY PERCEPTION AFTER FOODBORNE OUT-BREAKS**

Consumers food safety perception is the individual's awareness of the potential and amount of health risk and the consequences of consuming unsafe food product (Tonsor, Schroeder, & Joost, 2009; Schroeder, Tonsor, Pennings, & Minter, 2007). It involves the interpretation of the perceived risk for immediate decision-making (Grunert, 2005). Consumers perception about the food product safety often arise from the occurrence of foodborne out-breaks/food scares. Their food safety perceptions are multi-dimensional. They are influenced

by variable factors, that includes the product itself, psychological (lifestyle and values, expectations, socio-cultural effect, demographics, attitudes/beliefs) and marketing aspects (price, label, brand, convenience/availability, commercials) (Font-i-Furnols & Guerrero, 2014).

The questions about the product itself are related to food product appearance and its sensory properties. These include colour, package/product date, texture, smell and price, i.e., the extrinsic quality cues of the food product. Some consumers rely on these attributes to determine food product safety. Tonsor, et al., (2009) referred to these, as reliance on observable attributes. Risk perceptions for individuals who rely more on observable attribute information are lower, and they are higher in individuals who rely on credence attributes (organic, natural, traceable, brand name and country of origin) (Tonsor et al., 2009). Typical examples of these phenomena have been observed in a number of empirical studies, which are discussed below. They are explained in terms of psychological and marketing aspects associated with the perceived risk.

According to research, socio-demographics play a significant role in determining consumer perception of risk in food safety, and they vary between population subgroups (Nayga, 1996). Older consumers frequently reveal lower food risk perceptions and believe that they are at low risk of contracting foodborne illnesses. While younger consumers have shown increased perceptions of food safety risk (Cates et al., 2006; Evans & Redmond, 2016). Cates, et al. (2004) reported lower risk perception of *listeria* in frankfurters and deli meats for old people (60 years+). Similarly, Evans and Redmond (2016) observed the potential risk factors associated with listeriosis in older adult's domestic food safety practices. They found that about 80 % of the respondents ( $\geq 60$  years) who participated in their study stored and consumed the RTE foods (sliced cured and cooked meats, pâté and prepared salads) most commonly associated with *listeria* beyond the recommended storage dates. They also found that a large proportion of older consumers reported to rely on senses of smell, taste and appearance to check if food products associated with listeriosis are safe to eat. However, the review of Nayga (1996) indicated that the rate of depreciation of good health increases with the increase in age, and thus older individuals might be more risk averse to food safety issues than younger individuals. Households with young children are reported to be more risk averse, and in general, parents perceive risks to be more relevant to their children than themselves (Cates, et al., 2006; Tonkin et al., 2016).

When considering gender, many studies indicated that women are typically more concerned about food safety issues than men do, hence display higher risk perceptions than men (Nayga, 1996; Redmond & Griffith, 2004; Tonsor et al., 2009; Evans & Redmond 2016; Liu & Ma, 2016). Roseman and Kurzynske (2006) investigated the food safety perceptions and behaviours of Kentucky consumers. They found that females were significantly more likely to stop eating a particular food because of safety concerns than males. In South Africa, Dikgole, et al. (2019) studied the consumption patterns of cold meats with the North-West university students during the listeriosis out-break 2017-2018 in the RTE meats, they found that male students consumed processed cold meats more than females regardless of news of the out-break. It is often shown that females tend to assume more responsibility for food safety within the household and consider themselves to have a lower risk of food-related illnesses than males (Redmond & Griffith, 2004; Schroeder et al., 2007). This could be because majority of women are responsible for the food preparation, storage and shopping in the home (Evans & Redmond, 2016; Schroeder, et al., 2007; Tsigarida et al., 2019). Cates, et al. (2006) reported high awareness of listeriosis in individuals who cook meals at least some of the time and shop for groceries compared with that of individuals who never cook and shop for groceries.

Food safety risk perception may also vary significantly with race and ethnicity (Van Loo, Ricke, Milillo, Seideman, & Crandall, 2010; Cates et al., 2004). In the U.S., Cates, et al. (2004) found that white non-Hispanic had higher risk perception of *listeria* in frankfurters and deli meats compared to black non-Hispanic individuals. While, Van Loo, et al. (2010) found that respondents who identified themselves as Caucasian tended to perceive deli foods to be equally as safe as restaurant foods, compared with the non-Caucasian respondents, who perceived deli foods as more likely to be safer than restaurant foods. The perception that food at the deli counter is relatively safe for these groups of people might be due to the low awareness of *Listeria* and unfamiliarity with the frequency of problems it can cause in RTE meats (Cates et al., 2004; Van Loo et al., 2010).

Level of education, income, and media exposure are considered to influence the consumers perception of food safety (Cates et al., 2004; Liu & Ma, 2016; Louw & Van der Merwe, 2020). People with higher level of education are more concerned about food safety risks than those with lower level of education (Liu & Ma, 2016). Cates, et al. (2004) reported lower awareness of *listeria* in frankfurters and deli meats in people with relatively lower education and income in the U.S. According to Nayga (1996), education reflects an individual's ability to understand and react to food safety information. Highly educated people may be more

likely to read the scientific articles and prints, and may be more likely to be exposed to technical news sources (Nayga, 1996). They are more likely to question the reliability of food safety regulation systems, hence they have high food safety perception (Liu & Ma, 2016).

Individuals with lower incomes are often reported to have lower food safety risk perception than individuals with higher incomes. This is because lower income earners are mostly concerned about survival with sufficient amount of food, regardless of whether it is safe enough to avoid foodborne illnesses or maintain personal health. This was observed in SA during the listeriosis out-break 2017-2018. An extensive recalls of products manufactured by the implicated company was made. All the products including non-polony meat products, both RTE and non-RTE, were also recalled as a precaution. Many consumers disposed their products in municipal bins, which landed on landfill sites. The waste pickers are not food secure, and therefore they consumed discarded products and shared them with others (Anelich, 2018). A case study, which explored the consumption patterns of cold meats by the North-West University students found that despite the out-break, students who received lower meal allowances per month consumed more cold meats than students who received higher monthly allowances. That was justified to the limited budget of students, therefore more economical to purchase processed cold meat than fresh meat (Dikgako et al., 2019). Similarly, Cates, et al. (2004) reported lower food safety perception in frankfurters and deli meats for lower income consumers in the U.S. However, Chen and Timmins (2018) found no significant differences in how people react to food safety scandals based on their income level. Liu & Ma (2016) also find no evidence that Chinese residents with higher levels of family income are more concerned about food safety risks. This is because of the believe that food scandals are in connection with common cheaper rather than expensive foods consumed by the rich.

On the other hand, Louw and Van der Merwe (2020) found that low income earners may have low perception of food safety risks due to low media exposure. They evaluated how low income, South African urban food consumers obtained and retained information with regards to food safety during the listeriosis out-break in 2018. Their study revealed that generic food safety announcements are not sufficient to reach low income consumers. Tailored messages should specifically aimed at vulnerable groups in terms of income level, language and employment dynamics (Louw & Van der Merwe, 2020). This is supported by the findings of Tonsor, et al. (2009). They investigated how demographics influence consumer perceptions about beef food safety risks in major markets for North American beef including Canada, Japan and the United States. They found that Japanese consumers are more risk averse regarding beef

food safety than Canadian or American consumers. They concluded that efforts to influence beef risk perceptions and attitudes need to be tailored to the country of residence. The above excerpts is the indication that the dissemination of tailored communication materials is crucial to improve food safety (Tiozzo, Mari, Ruzza, Crovato, & Ravarotto, 2017).

Consumers may also have high risk perception when they pay attention to the media than just simple media exposure (Liu & Ma, 2016). In addition, the type and source of information play an important role on consumer food safety perceptions. Technologies that allow easy access to information such as smart phones and broadcasted media is reported to have greater impact than print media (Brady, Li & Brown, 2006; Louw & Van der Merwe, 2020). For instance, Brady, et al. (2006) investigated how the media influenced consumer perceptions towards the risk of foodborne illness after the *Escherichia coli* out-break in spinach. Consumers were asked to rank the risk factors of foodborne illness. They learnt that people who watch or listen to news on TV or the radio on a regular basis had significant responses in their ranking of the risk of foodborne illness, whereas those who do not listen to media news more often did not have significant differences in their responses. Louw and Van der Merwe (2020) investigated asymmetry in food safety information in low income urban consumers in Gauteng during listeriosis out-break in 2018. They realised that low income earning consumers are more vulnerable to food safety issues due to their limited access to advanced information technologies, and thus, the information shared on these platforms. Consequently, they found that low income consumers were less familiar with the term “listeriosis” as well as knowledge associated with products and brands implicated in the out-break.

Trust in various sources of information directly influence food safety risk perception (Mazzocchi, Lobb, Traill, & Cavicchi, 2008; McCluskey & Swinnen, 2011). However, there is no consensus in the literature about which source of information is considered as the most authentic by the consumers. The consumers ratings for the credibility of sources of information varies a lot across studies. Some consumers trust more in the scientific experts (food safety and health professionals), government authorities, consumers organisations, social networks (friends and family members) and media , respectively (Mazzocchi et al., 2008; Kuchler, 2015; Dey, Gavaravarapu, Banerjee, Balakrishna, & Vemula, 2018). Their trust level is determined by the consumers trust characteristics. Those who have less trust in food safety information, independently of the source, tend to be less sensitive to risk perception and rely more on their social network. Those who are most inclined to trust information from any source are the most

sensitive to changing risk perception levels, but those who have a mixed trust attitude also react significantly to changing risk perceptions. These two groups have in common a relatively high level of trust towards experts (e.g. food standard, safety and health authorities, and scientists) (Mazzocchi et al., 2008).

Consumers reaction towards the credibility of the media as the source of information is always uncertain. It appears with differing consumer responses (Kuchler, 2015). It induces either negative or positive perception to consumers. Distrust of the institution providing the information increases the risk perception of the consumers (McCluskey & Swinnen, 2011). Tiozzo, et al. (2017) investigated Italian consumers' opinions about the role of media sources in delivering information about food risks in order to understand what information sources people trust. Most of the participants in this study blamed the mass media, especially television newscasts, for consciously amplifying risk situations related to food safety issues. Inflated food safety risks fuels consumers food anxieties (Dey et al., 2018 ) and result in unfair rejection of the products for unknown or not well defined risk (Nardi, Teixeira, Ladeira, & De Oliveira Santini, 2020, McCluskey & Swinnen, 2011). For instance, Listeriosis out-break 2017-2018 in RTE meats in SA was highly publicised and that raised a public concern about eating of “polony” in SA and beyond its borders. As a result, there was a negative demand for processed meats (Bonorchis, 2018), and risk averse consumers rejected all the RTE and non RTE meat products, including those that were not involved the out-break.

Consumers also make food choices based on the severity of pathogens and the associated health risks. According to Ruth, Yeung & Yee (2005) this is caused by the worries, fears, and emotional pressures about fatal consequence of food poisoning, which is a part of psychological risk. It has also been demonstrated that providing consumers with sufficient information regarding the type of risk makes it easier for them to assess their own personal risk (Vainio, Kaskela, Finell, Ollila and Lundén, 2020). Kuchler (2015) found that after the U.S consumers were informed about the risk of higher fatality rate in cantaloupes contaminated with *listeria* as compared to the lower fatality rate of cantaloupes contaminated with salmonella, the demand for cantaloupes in the year that they were contaminated with *listeria* was reduced, and consumers substituted other melons. No such shifts in demand were found under the lower fatality risk, despite more illnesses attributed to it.

The most peculiar finding observed in many studies is that consumers have the perception that contamination cannot occur in their own homes (Cates et al., 2006; Vanloo et

al., 2010; Tsigarida et al., 2019). This is because consumers associate home-prepared food with a low personal risk of food poisoning because they have control over it (Redmond & Griffith, 2004). Tsigarida, et al. (2019) conducted a national consumer survey to evaluate listeriosis risk related with the consumption of non-prepackaged RTE cooked meat products handled at retail stores in Greece. They also collected consumers food safety knowledge as well as domestic storage and food handling practices. The households surveyed reported to have experienced food poisoning and 81 % of them attributed it mainly to food prepared out of the home. However, the results showed that the prevalence and initial concentration of *Listeria* immediately after slicing as well as the temperature and duration of storage in the domestic refrigerator had the highest impact on the probability of illness per serving. They concluded that consumers domestic storage and handling of RTE meats may have an additional negative impact on their safety.

Although not consistent across studies, consumers also do not consider that contamination can occur at farm level and grocery store (Cates et al., 2006; Vanloo et al., 2010). They believe foodborne illnesses most likely stems from food handling procedures in the food manufacturing plants and the restaurants (Ventura-Lucas, 2006). Consumers believe that manufacturers and restaurants have the most responsibility for and control over the food safety (Cates et al., 2006). They consider themselves having insufficient knowledge to assess the safety level of a product at the shop or the product prepared at restaurants accurately (Ventura-Lucas, 2004; Whitworth, 2020a). For instance, in the case of the recent South African listeriosis out-break, Haslam (2019) found that the consumers had the perception that the Tiger brands/Enterprise (implicated manufacturing company) was responsible for the out-break. While some consumers believed that part of the blame lies with the government food safety inspectors (Whitworth, 2020a). Consumers view the government as an authority able to monitor and identify potential threats in food producers, even if the government is not that efficient performing as such (Nardi et al., 2020). However, the respondents interviewed in the study of Schroeder, et al. (2007) consider that everyone (producers, processors, grocers and retailers, food service establishments, government regulators, and consumers themselves) in the meat supply chain is responsible for helping to ensure food safety. It is apparent that consumers seem to worry more about how food products are handled prior to purchase than about how they are handled at home (Cates et al., 2006).

Individual consumers react to food safety risk in different ways, depending on their perception of the risk associated with a food product. The reported consumer responses towards

food scares or foodborne out-breaks have included change in food habits, behaviour and attitudes. Immediate rejection or drop in consumption of the implicated food product, loss of confidence in food chain and trust in governments food safety policy regulations have been reported in many studies (Ventura-Lucas; 2004; Anonymous, 2008; Figuié & Fournier, 2008; Bánáti, 2011).

A consumer survey conducted by the research group of the University of Guelph in Canada following the recall associated with *listeria* in RTE meats reported buying and behavioural changes in RTE meats. The study found that before the food recall, consumers did not consider the potential risks of RTE meats to be significant. After the recall 30 % of the Canadian consumers stopped buying RTE meats from Canada, 27 % of the consumers started eating RTE meats less often at restaurants and fast-food outlets, 32 % started cooking more food at home, 30 % took more time in food preparation and 52 % started paying more attention to food labels (Anonymous, 2008). In a study to assess consumers food safety perceptions and shopping preferences of ready to eat deli foods in Northwest Arkansas in the U.S., Vanloo, et al. (2010) observed a change in purchasing pattern. The majority (66%) of consumers perceived deli foods as safe as the restaurant foods, however the food safety perception depended on shopping frequency at delis. With an increasing frequency of shopping at stand-alone delis, consumers were more likely to perceive deli foods as “safer than” restaurant foods (Vanloo et al., 2010).

An immediate rejection of processed meat products was observed in SA after the announcement of the source of the listeriosis out-break, which resulted from the RTE meats in 2017. Some consumers refused to eat any products associated with the specific brand and other non-implicated brands that resembled any cooked, frozen or raw processed meats, or any products that contained similar ingredients. They returned all these meat products to the retailers for refund (Anelich, 2018; Haslam, 2019). Consumers lost trust and confidence in the implicated company and their processed meat products (Anelich, 2018; Gordan, 2018; Haslam, 2019). The study conducted in some regions of Durban found out that the out-break induced negative perception characterised by anxiety and fear, to an extent that consumers were not willing to purchase the processed meats from the implicated company in the future (Haslam, 2019). Some of the consumers responses from news interviews included ‘I lost trust in Enterprise (implicated company). I'll be scared even if they say this problem is solved’ (BBC News, 2018).

The study conducted with the low income urban consumers in Johannesburg reported that the implicated brands suffered social acceptance bias, which could have been caused by insufficient knowledge regarding the out-break. It was found that the level of knowledge regarding the listeriosis out-break could have been inflated. The results also showed degrees of brand confusion, only 52% of the respondents were able to attach a brand to the infected products (Louw & Van der Merwe , 2020). While Dikgole, et al. (2019) found that the out-break did not significantly influence the consumption of the RTE meats by the Northwest university students, instead the students continued to eat RTE meats but changed the brands.

The negative responses of the South Africans consumers towards the processed meats impacted badly on the processed meat industry. The demand for processed meat dropped by 75 % and the demand for pork cold cuts by 50 % (Bonorchis, 2018). The industry experienced further challenges to maintain sustainable production in pork. As a result the RTE meats prices dropped, particularly polony (National Agricultural Marketing Council (NAMC), 2018), leading to at least 80% decrease in sales of the RTE meats (Gordan, 2018).

Other studies on food product recalls for *Listeria monocytogenes* from branded RTE meats have shown that the demand for recalled products sometimes decreases. If there can be a brand recovery, the pattern displays at least some degree of consumer aversion to recalled brands, with an immediate decline in sales of the products (Thomsen, Shiptsova, & Hamm, 2004). However, if recalls provide consumers with product safety information, they view the problem as a brand problem and not a category problem (Thomsen et al., 2004). Thomsen, et al. (2004) analysed food safety events recalls for *Listeria* in frankfurters in relation to information provided through branding. After quantifying and determining the impact of sales on recalled and non-recalled brands. They found that non recalled brands did not suffer sales losses as a result of a recall, rather non recalled brands experienced an increase in sales when a competing brand was involved in a recall. They concluded that brand equity provided a signal to the consumer about product safety.

It has also been shown that after the crises stops or lessen, consumption resumes. Figuié & Fournier (2008) reported that after the crisis of avian flu abated, consumers resumed their consumption of poultry. Similarly, after the recall of RTE meats associated with listeriosis out-break in Canada most of the consumers remained confident in the safety of Canada's food system. Regardless of the recall, about 70 % of the Canadian consumers stated that their perception on the safety of meat in general or of food as a whole has not changed. In addition,

75 % of the respondents considered RTE meats safe to eat. This suggests that Canadian consumers had not generalised the *listeria* food recall to their perception of food safety as a whole (Anonymous, 2008).

Conversely, Brady, et al. (2009) observed that behaviours and attitudes of the U.S. consumers did not change significantly following the out-breaks of *Escherichia coli* 0157:H7 in spinach and lettuce. The food safety news magazine also reported that consumers who had been directly infected by listeriosis in South Africa were still afraid to eat polony even after two years of the out-break. The woman who was infected with *listeria*, remarked, ‘It ruined my life’ (Whitworth, 2020b). ‘Now we don’t eat it (polony), since what happened I stopped buying it for the kids as I am scared something else will happen again,’ said the father of a five year old boy who got infected (Whitworth, 2020a). It is apparent from the cited literature that consumers trust in the food supply chain and overall risk perceptions are influenced by perceived consequences and experiences.

### **LIMITATIONS OF THE STUDY**

There are number of abridging assumptions in this study that could be misinterpreted. It is assumed that the reviewed surveys and the relevant food safety perceptions examined elicited true consumers responses. Surveys are hypothetical and subject to many biases since a number of factors related to them can result in responses that depend on the way the questions were asked. Finally, due to the limited number of foodborne out-breaks reported in South Africa, the reviewed literature contains only a few South African studies. As a result, the review may only provide a partial reflection of true South African food safety perceptions.

### **CONCLUSIONS**

A striking result across all the reviewed studies is that there is no single risk perception that is adequate to draw inferences about consumer risk perception towards food safety. There is considerable empirical evidence that different population subgroups have different perspectives on food safety risks, and respond to food risk communication in different ways. This implies a need for different marketing and tailored intervention strategies for each group.

Although listeriosis is not the first foodborne outbreak in South Africa, it brought food safety regulatory uncertainties into sharp focus. This review highlighted the negative impact of regulatory uncertainties, which resulted in problems affecting meat industry and ultimately being borne by consumers. Beyond the initial short-run responses from some consumers,

particularly risk averse consumers who refrained from eating all the processed RTE meats including products that were not implicated in the outbreak, the extent to which outbreak has shifted the South African consumer perceptions about the food system is an interesting question that remain to be answered. In the wide spread uncertainty created by the outbreak, it is perhaps natural for consumers to seek reassurance that their RTE meats are safe. As a result, more research is needed to identify the underlying factors that cause consumers to maintain or lose trust in food safety systems during times of crisis.

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