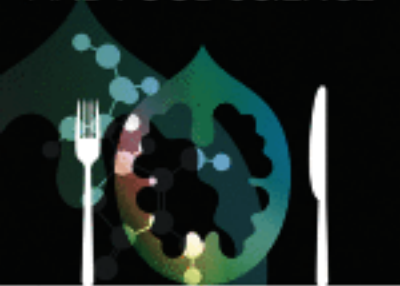




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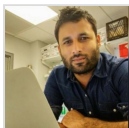
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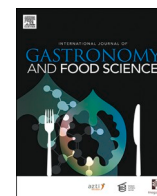
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Safety and authenticity practices in heritage food production in home-based and commercial catering: A multiple country case study

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ABSTRACT

In Saudi Arabia, cooking heritage food dishes has gained popularity owing to increasing attention to the tourism sector. Therefore, food service establishments, such as commercial catering, cook heritage dishes for tourists. In contrast, home-based catering focuses on cooking these dishes for locals. The present study gained insights into the authenticity and safety practices in preparing heritage foods in home-based and commercial catering settings in Saudi Arabia and compared them with those in Indonesia and Malaysia, which have a longstanding history of heritage foods in the hospitality industry. Sixty culinary professionals participated in the study: 30 from home-based catering (10 from each country) and 30 from commercial catering (10 from each country). Semi-structured interviews were used. For authenticity practices, similar findings were observed among all countries, and both catering types checked the availability of essential ingredients in advance as well as taste, flavour and texture to ensure the quality of the recipe. In terms of differences, compared with the culinary professionals in Indonesia and Malaysia, those in Saudi Arabia emphasised the importance of authenticity practices, including having an experienced cook, following specific written recipes, supervising new cooks, providing advice to use the original recipe and presenting authentic dishes without modifications. In terms of similarities in food safety practices, most culinary professionals in the three countries suggested the importance of checking colour and freshness; cleaning equipment with water and chemicals (soap); and wearing protective cooking uniforms (aprons). However, most Saudi Arabian culinary professionals mentioned various other food safety practices compared with other countries, including checking smell, washing hands and regularly changing gloves, washing cooking equipment with special chemicals, closing catering services when owners are unwell or not allowing cooks to work when unwell. These practices can help prevent cross-contamination and produce safe heritage dishes.

1. Introduction

There is growing interest in cultural foods such as ethnic, traditional, local and heritage foods among consumers (Cui et al., 2020; Jakubowska and Pacholek, 2022; Kauppinen-Räsänen et al., 2013; Riptiono et al., 2023; Sims, 2009). These food concepts encompass cultural aspects, however, their focus is slightly different. Ethnic foods are classified based on the dimensions of people and places; traditional foods are

based on legacy and place and local foods are based on the dimension of place (Almansouri et al., 2021). Heritage food has been conceptualised as a food associated with all three dimensions: legacy, people and place (Almansouri et al., 2021). Heritage cuisine is important for locals because it has been passed down over generations and is a condensed reflection of their lifestyle (Zhang et al., 2019). Heritage cuisine also creates social bonds and cultural identities for locals (Brulotte and Di Giovine, 2016). Local cuisine provides a gateway for travellers to

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accurately learn about another culture by experiencing new food at places different from what they consume at home in terms of cooking, presentation and consumption (Hegarty and O'Mahony, 2001) and it allows visitors to appreciate a destination's culture (Chang et al., 2010). In particular, culture-specific foods are valued for their authenticity. Studies have reported that consumers perceive locally produced food as authentic and pure (Kauppinen-Räsänen et al., 2013; Sims, 2009). The growing interest in cultural foods has raised awareness of the need to protect the authenticity of such foods (Pearson et al., 2011) and ensure their safety, a prerequisite for any food type.

Authenticity has been conceptualised in various ways, encompassing multiple nuances and interpretations. According to Cambridge (2019), Collins (2019), and Ivanova et al. (2014), authenticity denotes qualities of being genuine, true, and real. Additionally, the concept extends to the faithful representation or replication of an original, as discussed by Chhabra (2005), Cohen (1988), and Collins (2019). However, authenticity is inherently subjective, particularly in the context of food (Hamzah et al., 2013; Heidegger, 1996). Groves (2001) defined food authenticity as the representation of a food product that is intrinsically linked to a specific location, region, or country. Furthermore, Assiouras et al. (2015) argued that food authenticity is a multidimensional construct encompassing factors such as geographical origin, methods of preparation, ingredient composition, traditional recipes, and contextual elements, including the serving and presentation of a dish to consumers. Previous studies have identified factors that can compromise the authenticity of heritage dishes, including scarcity of ingredients, not following the dish's recipe and using modern equipment instead of traditional ones for specific heritage dishes (Almansouri et al., 2021, 2022).

Besides authenticity, the safety of heritage food is also important. Several studies have reported food safety issues associated with the production of traditional foods in different countries, such as Germany (Lücke and Zangerl, 2014), Middle Eastern countries (Tajkarimi et al., 2013) and Turkey (Cagri-Mehmetoglu, 2018). Typical factors such as low-quality raw materials, poor hygiene of food handlers and equipment, improper cooking procedures and storage temperature were the reasons for the reported outbreaks (Lücke and Zangerl, 2014; Tajkarimi et al., 2013). A previous empirical study involving culinary professionals in Saudi Arabia was undertaken to elucidate the occurrence of authenticity and safety risk situations while preparing heritage dishes and demonstrate differences among types of food service establishments (FSEs) (Almansouri et al., 2023). The study shed light on the possible occurrence of safety and authenticity risk situations but actual practices were not investigated. Moreover, the study focused solely on Saudi Arabia, as the serving of heritage food to tourists is relatively new and becoming increasingly popular due to the growth of the hospitality sector (Ministry of Culture, 2019). In contrast, other countries, including Malaysia and Indonesia, have a longstanding history of serving heritage food dishes to locals and tourists (Fatimah et al., 2021; Saad et al., 2021) and both countries are well known for preparing heritage food dishes via home-based as well as commercial catering services (Arif et al., 2021; Octavia, 2019). By examining similarities and differences, we can identify best practices in culinary authenticity and deepen our understanding of how authenticity is maintained across different regions and how heritage food is integrated into tourism and hospitality.

The present study investigated the authenticity and safety practices in preparing heritage food in home-based and commercial catering services in Saudi Arabia compared to those in Indonesia and Malaysia, which have a longstanding history of serving heritage food in the hospitality industry. The comparison offers insights for countries aiming to sustain their traditional food industries while adapting to modern hospitality and health and safety standards. By learning from these diverse approaches, nations can balance heritage preservation and contemporary culinary innovation.

2. Materials and methods

2.1. Study design

To conduct this comprehensive multicase study, collaboration was established between researchers from Saudi Arabia, Indonesia and Malaysia. Semi-structured interviews with culinary professionals were designed to gain a deeper understanding of the practices to ensure authenticity and safety in home-based and commercial catering. A total of 60 culinary professionals participated in this study: 30 from home-based catering and 30 from commercial catering, with 10 from each country. Researchers in Indonesia and Malaysia underwent intensive training from the first author to conduct semi-structured interviews and ensure a consistent approach.

2.2. Selection of catering facilities and recruitment of participants

Home-based catering is defined as a family that consists of one or more members who dwell in the same place and engage in activities such as preparing traditional meals (Bureau of Experts at the Council of Ministries, 2019). Home-based catering is typically family-owned and employ usually native people who cook the heritage dishes. Home-based catering targets only the local customers as locals focus on the authenticity of the heritage dishes and they feel the home cooking taste of these dishes. Home-made food was perceived as authentic, pure, and traditional (Kauppinen-Räsänen et al., 2013; Sims, 2009). Another type of catering that cooks heritage dishes is commercial catering. Commercial caterings are defined as establishments that are open to the public and sell food and beverages primarily to make a profit. However, These catering businesses are valuable because they meet the demands of their customers, create job opportunities, and contribute significantly to the national economy (Matinise, 2019). Selection of home-based and commercial catering was based on the following criteria: (1) the home-based or commercial catering has a minimum experience of 5 years in the country's local market to ensure they have a good understanding of the authenticity and safety practices associated with the preparation of heritage food; (2) the home-based or commercial catering must cook heritage food dishes; (3) the home-based or commercial catering is recognised by locals for its quality and taste (via social media) where locals frequently share reviews, recommendations, and discussions about their services and (4) culinary professionals from these catering facilities have >5 years of experience and knowledge of heritage dishes. Culinary professionals were identified based on the information available on catering; the number of contacts was expanded by asking culinary professionals for other contacts. Recruitment was tailored to each country's local culture. In Saudi Arabia, culinary professionals in home-based catering were approached by a female contact to explain the study objectives. In commercial catering, the first author directly approached the participants. In Indonesia and Malaysia, researchers familiar with local habits approached culinary professionals in home-based and commercial catering.

2.3. Semi-structured interviews

Interviews were conducted at the convenience of the participants, whether in home-based or commercial catering. Three researchers (one from each country) conducted the interviews. The questions were open-ended and comprised the following: (1) a brief introduction, (2) general questions regarding heritage food (i.e. learning about cooking heritage dishes and famous heritage dishes cooked in the catering facility), (3) questions regarding the authenticity practices related to cooking heritage dishes, (4) questions regarding the safety practices related to cooking heritage dishes and (5) concluding questions, such as how they advertise heritage food dishes and the procedures for ordering heritage food dishes. The interviews were conducted face-to-face and took on average a 1 h.

2.3.1. Interview guide

To ensure consistency, the first author developed a comprehensive interview guide. The interview guide began by thanking the culinary professionals for their time and effort in participating in the study. Then, the study's aims and purpose were explained. Subsequently, two definitions were explained to allow culinary professionals to easily understand the terms. The following definitions of safety and authenticity

were used in this study: for food safety practices, 'Hygiene and safety refer to the measures to be taken according to any kind of legislation or rules to avoid food getting spoiled and/or people getting ill', and for food authenticity practices, 'Authenticity is about all kind of measures or activities that people apply to take care that heritage food is authentic and authentically prepared, so made according to the tradition'. Thereafter, ethical aspects were explained, and permission for recording

Table 1

Categories with their cores of meaning describing the food authenticity practices of heritage food (HF) in home-based and commercial catering as emerged from the interviews with the Saudi Arabian (SA), Indonesian (IN) and Malaysian (MAL) culinary professionals.

Categories ^a /subcategories ^b	Specific practices ^b	Home-based			Commercial		
		SA	IN	MAL	SA	IN	MAL
A. Ensuring the availability of essential ingredients							
Checking essential ingredients	Checking the availability of essential ingredients in advance						
	Checking taste and smell						
Alternatives to missing ingredients	Substituting ingredients but not essential ones						
	Ordering ingredients from other regions						
	Finding a solution for missing ingredients						
	Using only essential ingredients or not cooking the dish						
B. Ensuring compliance with recipe procedure							
Provide accurately written recipe	Specific written recipe						
Supervising and teaching cooks	Knowledgeable chefs supervise cooks						
	Teaching new cooks						
Knowledgeable cooks	Experienced cooks						
	Learned from previous generations						
Customer satisfaction	Checking customer satisfaction with dishes						
Checking sensory characteristics	Checking taste, flavour, and texture						
Checking cooking	Checking the recipe during cooking						
C. Ensuring knowledge of cooks							
Competent cooks	Knowledgeable/experienced/skilled cooks						
	Choosing native locals cooks						
	Family relatives cooks						
	Evaluating the cook before hiring						
Training and supervision	Supervising non-Saudi cooks						
	On-the-job training of cooks						
Self-learning of cooking	Learning from social media						
	Learning from a cooking book						
D. Ensuring traditional equipment use							
Traditional equipment (partly) ensured	Traditional equipment use is dish-dependent						
	Importance of traditional equipment for taste and flavour						
	Knowledge of using the traditional equipment						
Traditional equipment is not applied	Traditional equipment replaced by modern equipment						
	Fast modern equipment not influencing taste						
	Traditional equipment is not possible because of the price						
	Traditional equipment not allowed (e.g., because of food law)						
	No traditional equipment needed						
E. Ensuring authenticity while serving customer needs							
No modifications	No modifications because of heritage, culture, authenticity						
	Providing advice to take the original recipe						
Change the recipe conditionally	Changing the recipe but first, give advice or let them try						
	Changing the recipe but not the essential ingredients						
	Changing the recipe because of health issues						
	Changing the recipe but keeping the authenticity						
	Changing the recipe according to the customer's request						

a: Categories created by deductive approach. b: subcategories and specific practices created by inductive approach.

Green: Most/Majority of the culinary professionals mentioned the food authenticity practices (6 ≥ culinary professionals).

Red: Few/fewer culinary professionals mentioned the food authenticity practices (5 ≤ culinary professionals). White: it was not mentioned by culinary professionals.

was obtained. Each participant signed a consent form. Finally, interview sections were provided at the beginning of the interviews. The researchers from each country were trained to interview the culinary professionals using the interview guide.

2.3.2. Interview pretesting

Before starting the pretesting, the questions were translated into the country's local language and then piloted to check whether the formulations fit the local language and whether it was clear to the interviewees. The local researchers in Indonesia, Malaysia and Saudi Arabia pretested the interviews. Only minor changes were made to improve the understanding of the interview questions.

2.4. Data analysis of the interviews

Information collected from the in-depth interviews in each country was transcribed, translated, coded, synthesised, and organised manually under thematic headings. Interviews were coded using a hybrid deductive/inductive analytical approach. This approach allows researchers to identify themes using broad *a priori* categories (i.e. deductive) as well as generate unique categories from qualitative data (i.e. inductive) (Trofholz et al., 2022). Deductive categories were identified based on the findings of previous studies (Almansouri et al., 2021, 2022). Thematic analysis was performed as previously described by Almansouri et al. (2021). Briefly, thematic analysis of raw data included (1) reading and re-reading the corpus to become familiar with its contents and (2) developing the coding system, which involved generating concise labels (i.e. analysis units, context units, core meanings and subcategories) arising from the corpus. All the core meanings and subcategories were classified under specific categories that were identified deductively. After finishing the first round of authenticity and safety data analyses, another author verified the established coding system and discussed it with the second and final authors. This action reduces bias in qualitative data analysis and ensures reliable inference of patterns from the data (Lester et al., 2020; Zanin et al., 2021).

2.5. Ethical approval

This study was approved by the Social Sciences Ethics Committee of Wageningen University and Research (Number:2021-56-Luning). All participants agreed to participate and signed the informed consent form.

3. Results and discussion

3.1. Authenticity practices in home-based and commercial catering facilities in the three countries

Five categories of major authenticity practices for heritage foods identified in a previous study were used: (A) ensuring the availability of essential ingredients, (B) compliance with recipe procedures, (C) cooks' knowledge, (D) traditional equipment use and (E) ensuring authenticity while catering to customer needs. Table 1 presents, per category, the subcategories and diversity of authenticity practices that emerged from the interviews with the culinary professionals in home-based and commercial catering in Saudi Arabia, Indonesia and Malaysia. For example, to ensure the availability of essential ingredients (A), culinary professionals either check the essential ingredients or search for alternatives. To ensure compliance with recipes (B), practices included providing an accurate recipe, supervising and teaching cooks, hiring knowledgeable chefs and checking customer satisfaction with authenticity after eating. Typical practices to ensure a cook's knowledge included having competent chefs, training and supervising them or gaining knowledge through self-learning (C).

Despite the wide range of practices, Table 1 shows that the common practices among all culinary professionals were ensuring the availability of essential ingredients in advance and using sensory characteristics to

verify compliance with recipe procedures similar to the study of Sharif et al. (2016). Experienced chefs and cooks are aware that following a recipe is not just a matter of measuring the ingredients and following the steps in order and that it is important to use all their senses—sight, smell, taste and touch—to ensure that the dishes come together, as illustrated below.

'I have experience in cooking heritage dishes for a long time. I know exactly what I should do for the recipe by checking till I reach the desired taste of the heritage food' (SA/HC 5).

'Usage of essential ingredients is very important for heritage dishes. Usually, we order it in advance so the customer can be satisfied with our food. We do not change the essential ingredients at all' (IN/CC 7).

'We can tell how the heritage dish is prepared just by its smell, taste, and appearance' (MAL/HC 2).

Different cultures emphasise the use of specific ingredients and preparation techniques for heritage dishes. In Saudi Arabia, some of the key ingredients used in such dishes are dates, cardamom, saffron and various spices. These ingredients impart a unique taste to heritage dishes, a key criterion for evaluating the authenticity of local dishes (Greco, 2022). In traditional Malay cuisine, ingredients such as lemongrass, turmeric and coconut milk are essential for creating distinct flavours and aromas associated with their cuisine.

3.1.1. Authenticity practices in home-based catering in Saudi Arabia compared with other countries

Table 1 demonstrates that for home-based catering, most culinary professionals in all countries stressed that knowledgeable and experienced cooks are important for ensuring the authenticity of heritage dishes.

'Since I am the only person who cooks the heritage dishes, I have the knowledge and skills about these dishes. I cook the same dishes for a long time, and the recipe is already used for many years' (SA/HC 8).

'The owner has a long experience in cooking heritage food and she cooks the heritage food herself' (IN/HC7).

'I prepare the heritage food dishes based on my memory and experience' (MAL/H7).

Some culinary professionals from Saudi Arabia mentioned that they chose family relatives as cooks to ensure the cook's knowledge.

'I taught my daughters everything about cooking heritage dishes because this is the important thing they need to know to keep and preserve for the future' (SA/HC 7).

In Saudi Arabia, experienced cooks who have learned about heritage dishes from previous generations or are trained in traditional culinary schools have a comprehensive understanding of the cultural and historical context of the dish and are considered important cultural artefacts. There is a sense of responsibility among those who prepare these dishes to prepare them in a manner that accurately reflects their cultural origins. Women in Saudi Arabia mostly prepare traditional meals for their families, which is their primary responsibility as homemakers (Kaufman, 2010). Moreover, daughters are expected to acquire cooking abilities from their mothers while they are still young. With continued practice, daughters can prepare various traditional dishes for their families (Alissa, 2017). In Indonesia, daughters are always included when traditional foods are prepared by their mothers (Sutrisno et al., 2021). Cooking is not just a skill but also a form of cultural knowledge that is passed over generations through family members. In Malaysia, grandmothers and mothers are considered the primary sources of knowledge and experience in food preparation, emphasising the importance of the intergenerational transmission of culinary knowledge (Chenhall, 2010). These studies highlight the importance of families and communities in preserving cultural heritage and traditions.

Regarding serving customer needs (E), most Saudi professionals in home-based catering stressed that when customers request the recipe to be modified, no modifications are made by the culinary professionals because it is part of heritage, culture and authenticity (Table 1), as illustrated below.

'For me, I cook only the authentic dishes. I will not change anything about my heritage dishes as it is part of our culture. If they want to change anything in the recipe, they can go and request from other restaurants or families' (SA/HC 4).

Almansouri et al. (2023) have reported previously that the practice of adapting a recipe to consumer preferences is rare in home-based catering in Saudi Arabia. However, in Malaysia, the modern and dynamic society has led to many changes in Malay food culture, cooking methods, equipment and eating decorum (Ishak et al., 2019); this appears to be a primary concern among the older generation and government (Ishak et al., 2013). Our findings suggest that Saudi professionals in home-based catering tend to prioritise the preservation of cultural heritage and authenticity in their cooking over the accommodation of customer requests for modifications to heritage dishes, reflecting a strong attachment to the cultural significance of food and a desire to maintain the integrity of traditional recipes.

3.1.2. Authenticity practices in commercial catering in Saudi Arabia compared with other countries

Table 1 demonstrates that for commercial catering, most culinary professionals in Saudi Arabia provide specific written recipes or have knowledgeable chefs who supervise less experienced cooks to ensure recipe compliance. In contrast, these practices were not mentioned by culinary professionals from Indonesia and Malaysia.

'We are writing the recipes for our cooks because these heritage dishes need to be documented. So we write every step with every small detail just to give us the desired taste and flavour' (SA/CC 2)'

'I have to go around while the cooks are cooking and see if they are following the recipe or not. Supervision for the heritage dishes is important because it represents our identity' (SA/CC 8).

Elalem (2018) has reported that chefs in Saudi Arabia are experienced and skilled in preparing traditional dishes and place strong cultural and historical significance on these dishes. However, Almansouri et al. (2023) have reported that FSEs in Saudi Arabia are increasingly employing international chefs who lack the knowledge to prepare authentic heritage dishes. This emphasises the importance of documenting every step as well as small details of the recipe or supervising cooks in commercial catering facilities to ensure that dishes are prepared traditionally and authentically. Therefore, preserving heritage dishes may be important in commercial catering businesses in Saudi Arabia, whether via the experience and skills of local chefs or by documenting and supervising international chefs.

Furthermore, regarding ensuring knowledge (C), most culinary professionals in Saudi Arabia mentioned that they perform on-the-job training. In contrast, only a few culinary professionals in Indonesia and Malaysia mentioned this.

'I train all the cooks in my kitchen about the heritage dishes and let them practice them as well' (SA/CC 7).

Both Gazette (2020) and Sharif et al. (2015) have emphasised the importance of training and transferring knowledge about traditional cuisine to younger generations. Gazette (2020) highlighted how training cooks to prepare traditional dishes can not only help preserve the authenticity of heritage cuisine but also encourage the young generation to learn about traditional recipes from older generations. Similarly, Sharif et al. (2015) have reported that the willingness of older generations to teach and train younger generations about traditional Malay cuisine can lead to the accurate transfer of knowledge, skills and techniques.

Furthermore, most culinary professionals in commercial catering facilities in Saudi Arabia stressed that when customers ask for modifications to the recipe, either no modifications are made or they are advised to take the original recipe, which is similar to what was mentioned by the culinary professionals in home-based catering (Table 1). Nevertheless, these two practices were not mentioned by any of the culinary professionals in Indonesia and Malaysia.

'I cannot change the recipe of heritage food dishes because I will then

change the food of our culture and our heritage' (SA/CC 6).

'I will not change anything from my authentic heritage dishes because I cook only the original recipe. I always advise consumers to take the original recipe' (SA/CC 4).

Similarly, Almansouri et al. (2022) observed that Saudi Arabian chefs expressed concern about modifying heritage dishes because they believed that altering the recipe would harm the authenticity of the dish and make it unrecognisable as a heritage dish. However, the same study also observed the increasing prevalence of dietary preferences and food allergies in recent years, leading to a need to adjust recipes to accommodate customer needs (Almansouri et al., 2022).

However, culinary professionals in Indonesia and Malaysia in commercial catering appeared to be more flexible in responding to customer needs for modifications to their dishes. Various studies have argued that these cultures emphasise customer satisfaction and that tourism also plays a role because visitors have different dietary requirements and preferences (Fatimah et al., 2021; Saad et al., 2021). Ultimately, it is crucial to strike a balance between preserving cultural traditions and meeting customer needs in the catering industry. Communication with customers can help ensure that their needs are met but the cultural heritage is also respected.

Furthermore, in commercial catering in Saudi Arabia, culinary professionals ensured the availability of essential ingredients [A] by substituting some ingredients but not substituting essential ingredients or ordering essential ingredients from other regions (Table 1). These practices were not mentioned by culinary professionals in Indonesia and Malaysia.

'We serve heritage food dishes that are from other regions, however, the ingredients sometimes are not available. So we order the ingredients from these regions to bring them to us' (SA/CC 2).

Demir and Alper (2021) discussed how the nature of a country's geography can influence the kind of food and beverages available and the preparation methods of the ingredients. In Saudi Arabia, where certain ingredients may not be locally available, it may be necessary to order them from other regions to maintain the authenticity of heritage dishes. However, the practice of substituting ingredients, while necessary in some cases, can affect the authenticity of heritage dishes (Almansouri et al., 2023). This interplay between geography and ingredient availability also has implications for sustainability. Sourcing ingredients from other regions to maintain authenticity may increase environmental costs, such as carbon emissions from transportation. However, embracing regional and seasonal variations can promote sustainability by reducing reliance on long-distance supply chains. Striking a balance between maintaining authenticity and adopting sustainable practices ensures that heritage dishes remain culturally significant while minimizing their environmental impact.

3.2. Safety practices in home-based and commercial catering in the three countries

In a previous study, we identified seven common safety practices used in heritage food preparation. These practices are as follows: (A) checking ingredients, (B) handling ingredients upon arrival, (C) storing ingredients, (D) cleaning practices, (E) handwashing practices, (F) wearing protective clothes during preparation and (G) illness procedures. Table 2 shows, per category, the subcategories and various specific hygiene practices that emerged from the interviews with culinary professionals in both catering types in the three countries. The safety practices mentioned by most culinary professionals were as follows: checking ingredients based on their colour and freshness; cleaning equipment with water, chemicals and soap and wearing protective clothing while handling food. Awareness of the importance of the quality of ingredients used in traditional diets ensures the taste and appeal of the food as well as its safety for consumption (Abuqurayn, 2019; Jalis et al., 2014).

Table 2

Categories with their specific food safety practices of heritage food (HF) in home-based and commercial catering as emerged from the interviews with the Saudi Arabian (SA), Indonesia (IN) and Malaysian (MAL) culinary professionals.

Categories ^a /subcategories ^b	Specific practices ^b	Home-based			Commercial		
		SA	IN	MAL	SA	IN	MAL
A. Checking ingredients							
Sensory inspection	Checking taste and texture						
	Checking smell						
Visual inspection	Checking colour and freshness						
	Checking shape/appearance						
	Cleaning check (dirty, musty,etc)						
Physical inspection	Checking the production location and expiration date						
	Checking weight						
	Packaging check						
Trust suppliers	No inspection (trust ingredients from suppliers/supermarket)						
B. Handling ingredients at arrival							
Incoming ingredients handling	Direct storing and washing before use						
	Cleaning, storing and washing and disinfecting before use						
	Cleaning and storing						
	Washing, cleaning and direct use						
C. Storing ingredients							
Cold storage	Keeping in the fridge						
	Keeping in the freezer						
Fixed storage time	Fixed short storage period (one, up to a few days)						
	Maximum storage period depending on the product (two weeks up to three months)						
Expiry date storage	Positioning ingredients based on first in first out						
Dry storage	Container use						
Check products and equipment	Daily or every two days ingredients check (freshness, ..etc)						
	Checking temperature daily						
Direct use	Daily direct use of ingredients						
Wrapped in paper	Wrapping in newspaper						
D. Cleaning practices							
Manual cleaning equipment and tools	Cleaning equipment with water, chemicals (soap) and water						
	Special cleaning treatment of equipment/ cutting boards (sanitation box, chemical treatment)						
	Separated cleaning of cutting boards (soap and water)						
	One or two kinds of cutting boards (washed before with water and after with soap and water)						
Dishwashing	Use of dishwasher						
Use of hot water	Using hot water before and after cooking						
E. Handwashing practices							
Hand hygiene practices	Washing hands before and during cooking (soap and sanitiser)						
	Washing hands before cooking (soap and water)						
	Washing hands and wear gloves						
	Washing hands and regularly changing gloves						
	Personal hygiene based on self-consciousness						
Informing handwashing instructions	Written handwashing instructions						
	Teaching handwashing instructions						
Checking hygiene practices	Checking personal hygiene						
	Checking compliance with hand washing instructions						
F. Protective clothes during food preparation							

Kind of protective clothes	Wearing a protective cooking uniform (apron)								
	Wearing hairnet								
	Wearing protective shoes								
	Wearing gloves								
	Wearing mask								
No protective cloths	No protective cloths								
G. Illness procedure									
No ill cooks in the kitchen	Cooks are not allowed to work when ill								
	Catering closed when the owner is ill								
	Substitute the sick worker								
Check healthiness	Checking with the local doctor								
	Checking the physical health of cooks when comes to work								
	Checking the psychological health of cooks								
Sick cooks permitted in the kitchen	Noncontagious sickness permitted in the kitchen								
	Sick cooks permitted to work (with masks)								

a: Categories created by deductive approach. b: subcategories and specific practices created by inductive approach.

Green: Most/Majority of the culinary professionals mentioned the food safety practices (6 ≥, culinary professionals).

Red: Few/fewer culinary professionals mentioned the food safety practices (5 ≤ culinary professionals). White: it was not mentioned by culinary professionals.

3.2.1. Safety practices in home-based catering in Saudi Arabia compared with the other countries

Table 2 shows that most culinary professionals in home-based catering in Saudi Arabia mentioned that they check the smell, appearance, shape and presence of dirty/foreign particles as well as colour and freshness. The culinary professionals considered shape, colour and appearance as critical aspects of safety as these quality parameters indicate the ingredients are fresh, correctly handled and likely safe. Irregularities, discolouration and inadequate smell are typical indicators of spoilage, which do not necessarily compromise food safety but indicate the occurrence of undesired bacteria.

'I check the cleanliness of vegetables and we check also for the appearance' (SA/HC 2).

The culinary professionals in Saudi Arabia strongly emphasised the use of sensory cues to assess the quality of ingredients, in contrast to their colleagues in Indonesia and Malaysia. This distinction can be attributed to cultural variations and divergent culinary practices. Yavas and Tuncalp conducted an insightful study in 1984 to examine whether perceived risk affects consumer behaviour in the context of supermarket patronage in Saudi Arabia. They observed that consumers exhibit a preference for purchasing food products from grocery stores or local markets where items are openly displayed, enabling them to visually inspect, touch and even smell the goods before purchasing them (Yavas and Tuncalp, 1984).

Upon the arrival of ingredients (B), various culinary professionals in home-based catering in all three countries mentioned that they washed, cleaned and directly used the ingredients to cook their heritage dishes (Table 2). In Saudi Arabia, it is not a common practice to store ingredients, as reported previously by Almansouri et al. (2023). This practice suggests that home-based caterers in Saudi Arabia prioritise the use of fresh ingredients and immediate preparation over storage.

For handwashing practices (E), different strategies were adopted in each country. Most culinary professionals in Saudi Arabia mentioned that they wash their hands and wear gloves; however, culinary professionals in Indonesia mentioned that they only wash their hands before and during cooking with soap and sanitisers.

'I wash my hands first before I start my cooking, then I wear gloves' (SA/HC 7).

'Handwashing has become a habit, we wash our hands with soap and water before touching food ingredients and after handling food' (IN/HC 3).

According to Almansouri et al. (2023), more than 50% of the culinary professionals in home-based catering facilities in Saudi Arabia rarely compromise on handwashing and wearing gloves because of cultural and religious influences. In Saudi Arabia, but also Indonesia and Malaysia, personal hygiene, associated with religious practices such as ablution (part of it is the ritual of washing hands), is considered important and is practised every day (Abdraboh et al., 2016; Hidayatullah, 2020; Latif and Rahman, 2020). However, studies observed that hand washing before cooking is less frequent in Indonesian and Malaysian households (Hirai et al., 2016; Lihan et al., 2019). The reasons for this disparity may vary and be influenced by factors such as education, awareness and cultural norms.

For the illness procedure (G), each country seems to have a strategy for dealing with the illness of cooks. Most culinary professionals in Saudi Arabia indicated that catering is closed when the owners are unwell. In Indonesia, most culinary professionals mentioned that cooks are not allowed to work. In Malaysia, culinary professionals mentioned that they substitute sick workers with other cooks. Despite the various ways in which culinary professionals can prevent the spread of illnesses, some workers may still choose to work when they are unwell. Almansouri et al. (2023) observed that only 50% of the surveyed culinary professionals in home-based catering in Saudi Arabia reported that they rarely or never worked when they were unwell. In the present study, some culinary professionals mentioned that professionals with noncontagious illnesses are allowed in kitchens (Table 2). This may cause some workers to feel pressured to work when they are sick, even if their illness is not contagious. In contrast, Ibnu (2022) has reported a study among Malaysian females, that if a cook cannot work on a designated day, either because they were too busy or felt unwell, another person can replace the sick cook. This approach demonstrates a sense of community and understanding of illness in the Malay female community in the culinary industry.

3.2.2. Safety practices in commercial catering in Saudi Arabia compared with other countries

Table 2 demonstrates that most culinary professionals in commercial catering in Saudi Arabia mentioned that they check the ingredients via physical inspections such as checking expiry date, weight and packaging and store ingredients differently compared with Indonesia and Malaysia.

The high percentage (82%) of food handlers who perform physical inspections to check, for example, the expiration dates of ingredients, as

found by Al-Shabib et al. (2016), suggests that food handlers are aware of the importance of checking food quality and safety in their establishments. Similarly, a study conducted by Al-Mohaithef et al. (2021) among restaurant supervisors in the Dammam region of Saudi Arabia revealed that supervisors displayed good knowledge regarding safe temperature control for cold food (93.8%), as well as proper storage practices in the freezer (83.5%) and refrigerator (79.4%). However, the study also highlighted a concerning lack of knowledge regarding safe temperature control for hot food (14.4%) and the temperature range at which bacteria rapidly multiply (commonly known as the danger zone temperature) in food (15.5%). The limited understanding among restaurant supervisors regarding safe temperature control for hot food and the danger zone temperature is a matter of concern for public health. These knowledge gaps could potentially expose customers to foodborne illnesses if proper temperature control measures are not followed.

For handwashing practices (E), most culinary professionals in commercial catering facilities in all countries mentioned that they washed their hands before and during cooking using soap and sanitisers (Table 2). Furthermore, they provided written handwashing instructions, taught handwashing practices and checked compliance with the instructions. Alqarni et al. (2023) have reported that a high percentage (91.5%) of food handlers in Saudi Arabia wash their hands with soap before handling and preparing food as well as after using the toilet. In contrast, Putri and Susanna (2021) have reported that only 54% of food handlers washed their hands with soap, mostly because of the unavailability of soap at the sink. These findings suggest a lack of resources and awareness among food handlers in Indonesia regarding the importance of using soap for hand hygiene. Interestingly, Putri and Susanna (2021) also observed no significant relationship between the knowledge or attitudes of food handlers and their food handling practices. This suggests that simply having knowledge of or a positive attitude toward hygiene may not be sufficient to ensure good hygiene practices among food handlers.

Most culinary professionals in commercial catering in Saudi Arabia and Indonesia also mentioned that cooks were not permitted to work when they felt unwell. Moreover, in Saudi Arabia, several other procedures are undertaken for illness management, including closing catering when the owner is unwell, checking the physical health of cooks when they come to work and checking the psychological health of cooks. Al-Shabib et al. (2016) observed that most food handlers in Saudi Arabia take sick leave when they are unwell, which is a good practice to prevent the spread of diseases. However, Almansouri et al. (2023) observed that many culinary professionals in ordinary and heritage restaurants continue to work when they are unwell, increasing the risk of food contamination.

Commercial catering in Saudi Arabia, Indonesia and Malaysia are subject to licencing regulations that adhere to specific hygiene requirements. To ensure food safety, the Saudi Arabian Ministry of Municipal and Rural Affairs (2009), Indonesian and Malaysian Ministry of Health (2011) and (2009) have developed regulations regarding hygiene and sanitation practices in FSEs. A common element of these regulations is the requirement for food handlers to obtain a certificate indicating the successful completion of a food sanitation hygiene course. This certification emphasises the importance of proper training and knowledge to maintain high food safety and hygiene standards. By completing the course, food handlers obtain essential skills and understand the best practices for handling, preparing and storing food as well as preventing foodborne illnesses. These regulations, which are aligned with the standards of the Codex Alimentarius (CAC, 2003), aim to protect public health and ensure that commercial catering establishments maintain rigorous hygiene standards. Through these measures, authorities in Saudi Arabia, Indonesia and Malaysia aim to minimise the risks associated with foodborne diseases and safeguard consumer well-being.

4. Conclusions and limitations

To the best of our knowledge, this is the first study to provide insights into the authenticity and safety practices in home-based and commercial catering facilities involved in preparing heritage foods in Saudi Arabia, Malaysia and Indonesia. This was done to compare the practices followed by the newly established Saudi Arabia in preparing heritage food for tourists with those followed by Indonesia and Malaysia, which have a longstanding history of culinary hospitality. For authenticity practices, the findings were quite similar among all countries, and both catering facilities check the availability of essential ingredients in advance as well as taste, flavour and texture to ensure recipe compliance. In terms of differences, most culinary professionals in Saudi Arabia emphasised the importance of authenticity practices more than those in Indonesia and Malaysia, such as having an experienced cook, following specific written recipes, supervising new cooks, providing advice to use the original recipe and presenting authentic dishes without modifications.

Furthermore, this study sheds light on food safety practices in heritage food preparation. Most culinary professionals in the three countries indicated the importance of checking colour and freshness; cleaning equipment with water, chemicals (soap) and water and wearing protective cooking uniforms (aprons). In contrast, most culinary professionals in both catering facilities in Saudi Arabia mentioned various other food safety practices compared with other countries, including checking smell, washing hands and wearing gloves, washing hands and regularly changing gloves, washing cooking equipment with special chemicals, closing catering when owners are ill and not allowing cooks to work when unwell. These practices can help prevent cross-contamination and produce safe heritage dishes. Overall, the results of this study emphasise the importance of preserving authenticity and ensuring food safety during heritage food preparation. Culinary professionals and policymakers can use these findings to develop guidelines and best practices for heritage food preparation that prioritise both authenticity and food safety. This study has several limitations that should be considered. First, the study focused on specific geographic regions, which may have overlooked regional variations within each country, as culinary practices can differ significantly between urban and rural areas. The study's focus on culinary professionals also excludes the perspectives of other stakeholders, such as consumers, food inspectors, or suppliers, whose insights could provide a more holistic understanding of heritage food practices. Lastly, the narrow scope of analysis, centred on authenticity and food safety practices, may have missed other important factors like environmental sustainability, and cost considerations. Addressing these limitations in future research could provide a more comprehensive and nuanced understanding of heritage food preparation and its intersection with authenticity, safety, and sustainability.

Implications for gastronomy

The study's findings underscore several critical implications for the field of gastronomy, especially in the context of heritage food tourism. As heritage food dishes gain popularity in Saudi Arabia, driven by the growing focus on tourism, the culinary industry faces both opportunities and responsibilities to maintain authenticity and ensure food safety. The study's results highlight how authenticity practices are deeply embedded in Saudi culinary culture, with an emphasis on original recipes, experienced cooks, and strict adherence to traditional preparation methods. This focus reflects a robust commitment to cultural preservation, which is essential for promoting Saudi heritage cuisine in the global gastronomic arena.

By comparing Saudi Arabia with Indonesia and Malaysia, where heritage foods are well-established in hospitality, the study suggests that Saudi culinary professionals invest in balancing authenticity with modern food safety standards. The additional food safety practices observed in Saudi Arabia—such as frequent handwashing, glove

changes, and strict protocols for unwell staff—indicate a progressive approach to minimizing foodborne risks. These practices serve as a model for integrating traditional culinary arts with contemporary health standards, making heritage foods more appealing and trustworthy to tourists and locals alike.

For gastronomy professionals, these insights emphasise the value of training programs and policies that uphold heritage cuisine's authenticity while meeting safety expectations. In addition, tourism and culinary stakeholders could leverage these findings to enhance marketing strategies, highlighting the unique practices that ensure the quality and authenticity of Saudi dishes. This approach could position Saudi Arabia as a premier destination for heritage gastronomy, attracting tourists interested in safe and authentic culinary experiences.

For modern commercial kitchens and large-scale foodservice operations, adapting these practices involves incorporating authenticity-focused training programs and standardized food safety protocols. By developing comprehensive manuals, recipe consistency, and staff training, large operations can scale the preservation of authentic heritage dishes. Additionally, integrating technology like inventory management systems and smart kitchen tools can streamline operations while maintaining both the authenticity and safety of heritage food preparation. These adaptations may help to ensure the continued appeal of heritage cuisine in a growing tourism market, offering a safe and authentic culinary experience to a wider audience.

CRedit authorship contribution statement

Mohammad Almansouri: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ruud Verkerk:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Shahrim Ab Karim:** Formal analysis, Data curation. **Mohd Nazri Abdul Raji:** Formal analysis, Data curation. **Nurul Ismail:** Formal analysis, Data curation. **Probo Y. Nugrahedhi:** Formal analysis, Data curation. **Pieter A. Luning:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data that has been used is confidential.

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