

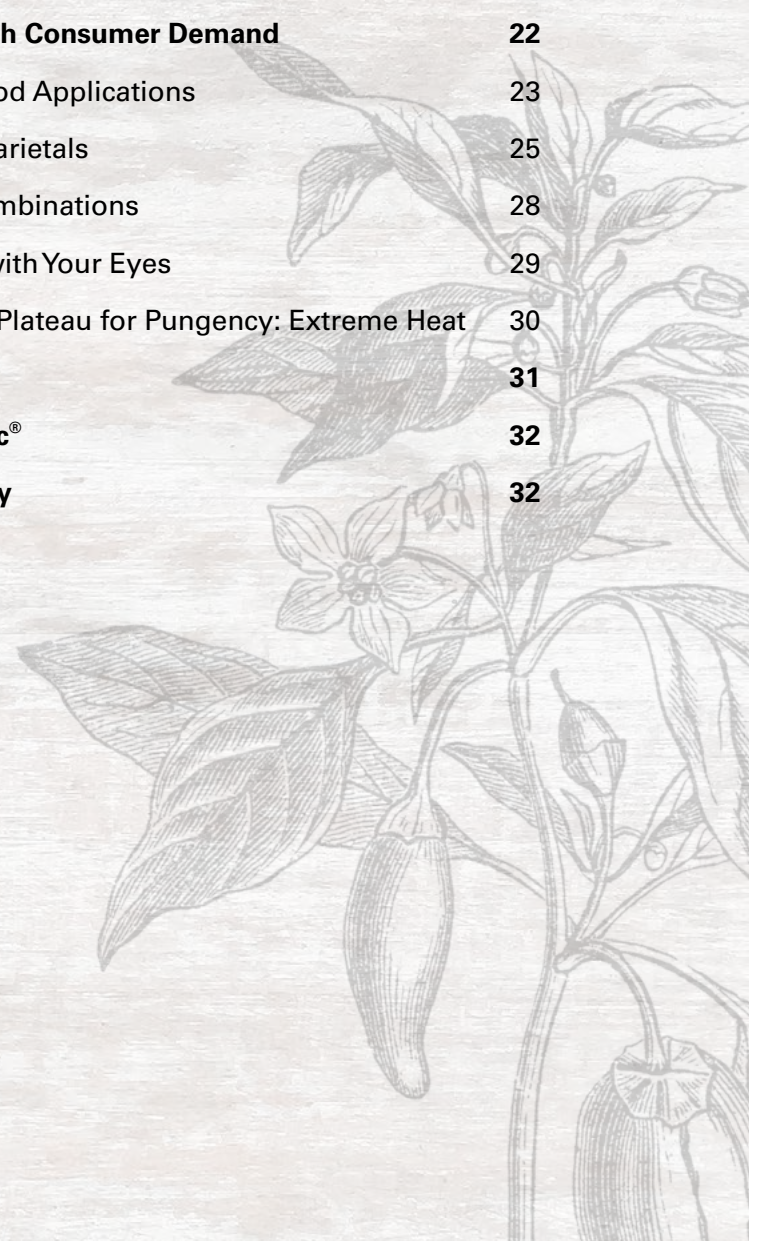
# *Spicy Perceptions*

HOT AND SPICY FOOD INDUSTRY INSIGHTS



# *Spicy Perceptions: Hot and Spicy Food Industry Insights*

<b>Spicy Perceptions</b>	<b>1</b>	<b>Growing with Consumer Demand</b>	<b>22</b>
<b>Defining Mild, Medium and Hot</b>	<b>5</b>	Spicy Food Applications	23
<b>Global Consumer Trends</b>	<b>9</b>	Pepper Varietals	25
The Influence of Age	11	Tasty Combinations	28
Regional Specificity	12	Tasting with Your Eyes	29
Regional Insights: The Americas	13	Sensory Plateau for Pungency: Extreme Heat	30
Understanding Heat Delivery Differences	14	<b>Conclusions</b>	<b>31</b>
Regional Insights: Europe	16	<b>About Kalsec®</b>	<b>32</b>
Interpretations of Pungency	18	<b>Methodology</b>	<b>32</b>
Regional Insights: Asia-Pacific	19		
What is Tangy?	21		







# *Spicy Perceptions*



# Spicy Perceptions

Over half of global consumers choose spicy options when dining out compared to 43% in 2017.<sup>1,2</sup> Half of consumers also choose spicy options when dining at home. This continued growth in all eating spaces, and specifically in the at-home dining component, means there are a lot of opportunities for food processors, manufacturers, quick service restaurants (QSR) and consumer packaged goods (CPG) companies to innovate their product offerings.

**To better understand consumers, Kalsec researched and collected new global insights. Our key findings are:**



In 2019, there is significant growth **in interest and consumption of hot and spicy foods** over previous years.



**Consumers have different perceptions of pungency levels across the globe**—mild, medium and hot have different interpretations.



Preferred flavors, pungency and types of spicy foods **differ by region.**



Globally, consumers are more comfortable **trying new spicy flavors in familiar savory foods.**



**Consumers care about specificity in:** ingredients, peppers and authentic flavor profiles.

<sup>1</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.

<sup>2</sup> From *Spicing Up the Food Industry: Hot and Spicy Trends and Insights [PDF]*. (2017, November). Kalamazoo: Kalsec, Inc. which can be downloaded at <https://www.kalsec.com/hot-spicy-flavor-trends/>





**Over 50%**  
of global consumers  
choose spicy options when  
**dining out**  
and when making  
**meals at home.**

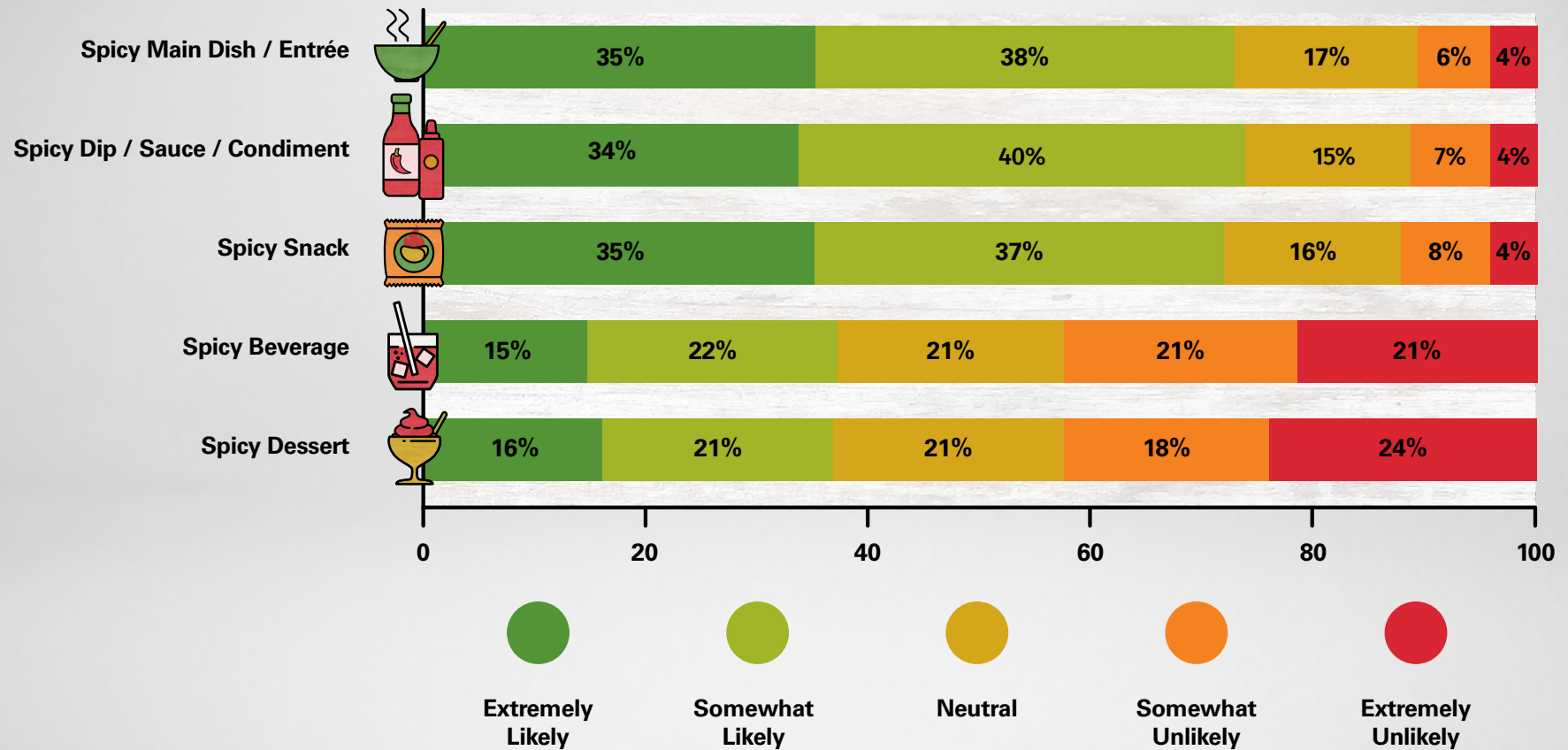


**62%**  
of consumers agree that  
**most savory foods**  
taste better  
with some level  
of spiciness.<sup>3</sup>

<sup>3</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.



## Likelihood of Global Consumers to Try a New Spicy Food<sup>4</sup>



<sup>4</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.





## *Defining Mild, Medium and Hot*



# Defining Mild, Medium and Hot

Each region of the world has a different definition and expectation of what consumers perceive as mild, medium and hot. Kalsec analytical and sensory scientists evaluated 59 products from different regions of the world to measure pungency in major capsaicinoids (MCs) and compared MC concentration to the heat level claims on the front label of products.<sup>5</sup> Please note that in the statistics below, the heat level of “medium” varies by region<sup>6</sup> and that the preferences are in reference to foods that are meant to be spicy.



**40%**

of consumers enjoy a  
**medium level**  
of heat.



**28%**

of consumers enjoy a  
**hot level**  
of heat.



**7%**

of consumers enjoy an  
**extremely hot level**  
of heat.

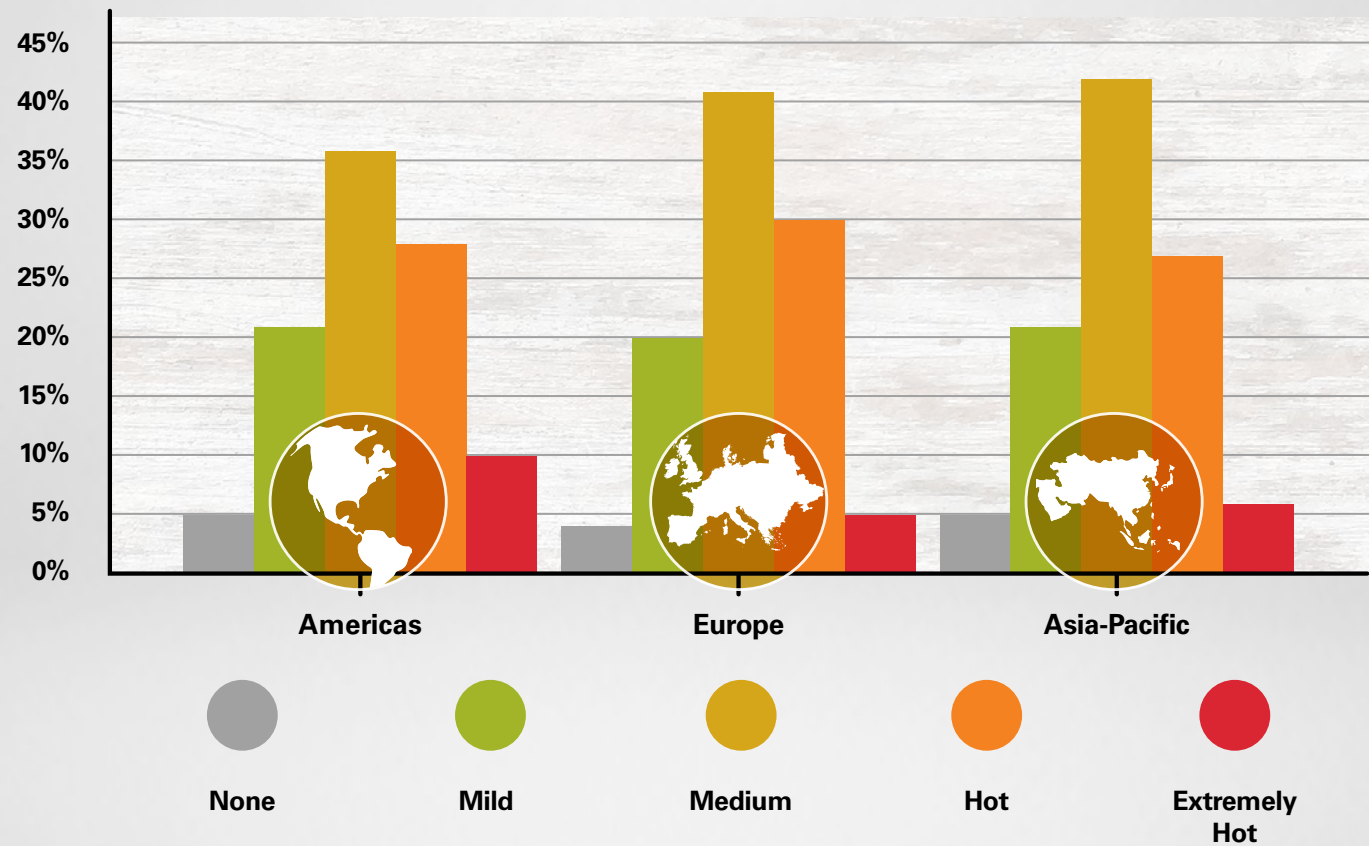
<sup>5</sup>Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas, and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.

<sup>6</sup>Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.



When asked what level of heat consumers enjoy in foods that are meant to be spicy, answers across the globe were similar—with medium heat levels being the most popular answer, followed by hot, then mild.<sup>7</sup>

Level of Heat Consumers Enjoy in Foods Meant to be Spicy

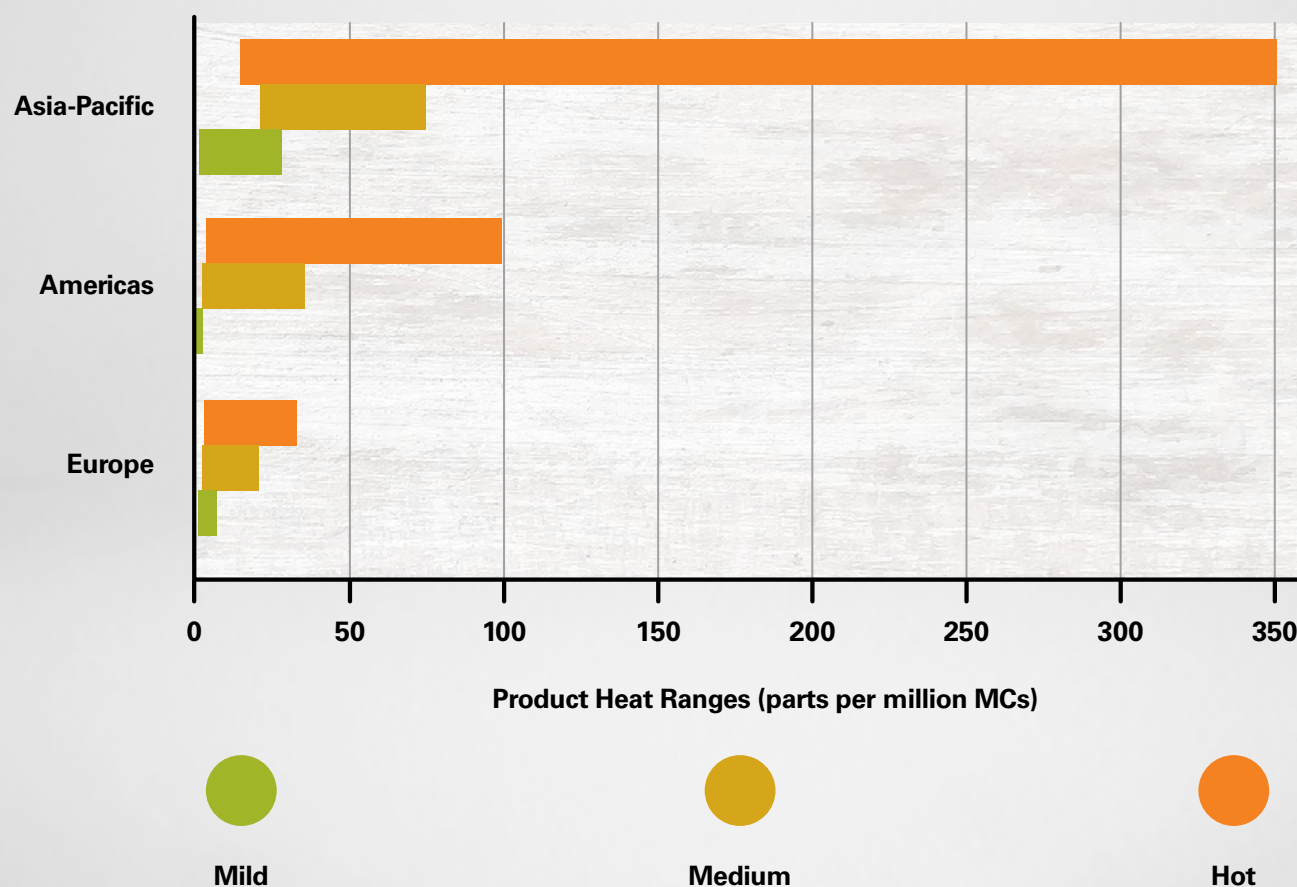


<sup>7</sup>Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.



The perception of what constitutes mild, medium and hot varies by region and country. As shown, the ranges of actual MCs measured in products labeled mild, medium and hot are vastly different in each region.<sup>8</sup> Based upon the products tested and the heat level claims on the front label of those products, there is overlap in the ranges. Looking at the ranges, products labeled hot consistently have the largest variance in MC range. It is easy to see products in the Asia-Pacific region scale much hotter than other countries where products were tested. Europe has the smallest range from mild to hot.

### Actual Heat Levels of Products Labeled Mild, Medium and Hot



<sup>8</sup>Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas, and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.





# Global Consumer Trends



# Global Consumer Trends

One half of global consumers say they are eating spicier food more often than they were just one year ago.<sup>9</sup> These numbers have doubled compared to 2017 data,<sup>10</sup> indicating interest in spicier food has risen significantly in the past two years among global consumers.

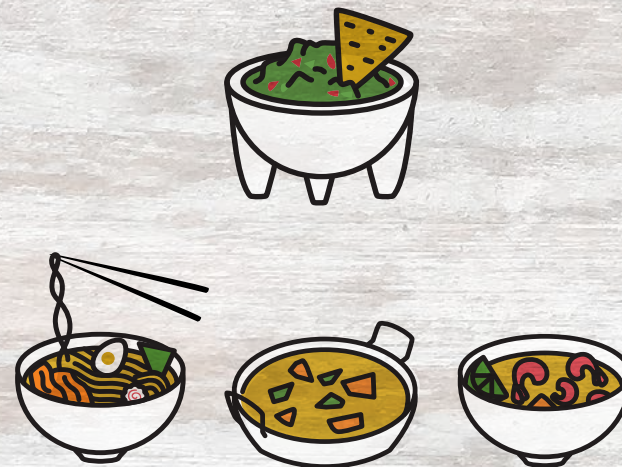
In 2017, we reported that men preferred higher levels of heat in their foods and consumed spicy foods more often than women. However, our 2019 survey results show women now prefer the same level of heat at the same rate of consumption as men.

Overall, consumers prefer their own local cuisine when it comes to spicy foods. Familiarity with the food they are eating offers more of an opportunity to experiment with different heat levels. However, when asked about specific regional cuisines, spicy Mexican foods topped the charts across the globe.<sup>11</sup>

<sup>9</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.

<sup>10</sup> From *Spicing Up the Food Industry: Hot and Spicy Trends and Insights [PDF]*. (2017, November). Kalamazoo: Kalsec, Inc. which can be downloaded at <https://www.kalsec.com/hot-spicy-flavor-trends/>

<sup>11</sup> Consumers were asked, "In which types of cuisine do you enjoy spicy food?" with choices of American, Chinese, Indian, Italian, Mexican, Thai, African, Korean, Latin American, Middle Eastern, Mediterranean and Other.



Globally, the most enjoyed  
spicy cuisine is  
**Mexican,**  
followed by Chinese,  
Indian, and Thai, respectively.



## The Influence of Age

As consumers age, their preference for spicy food changes according to our data.<sup>12</sup> For example, the 18-to-44-year-old age group is increasingly eating spicier foods more often. As consumers age above 45, their interest in eating spicier food declines.



### 35-54 year olds

are more likely than  
younger and older  
peers to care about  
**specific ingredients**  
that contribute to heat.



### 35-44 year olds

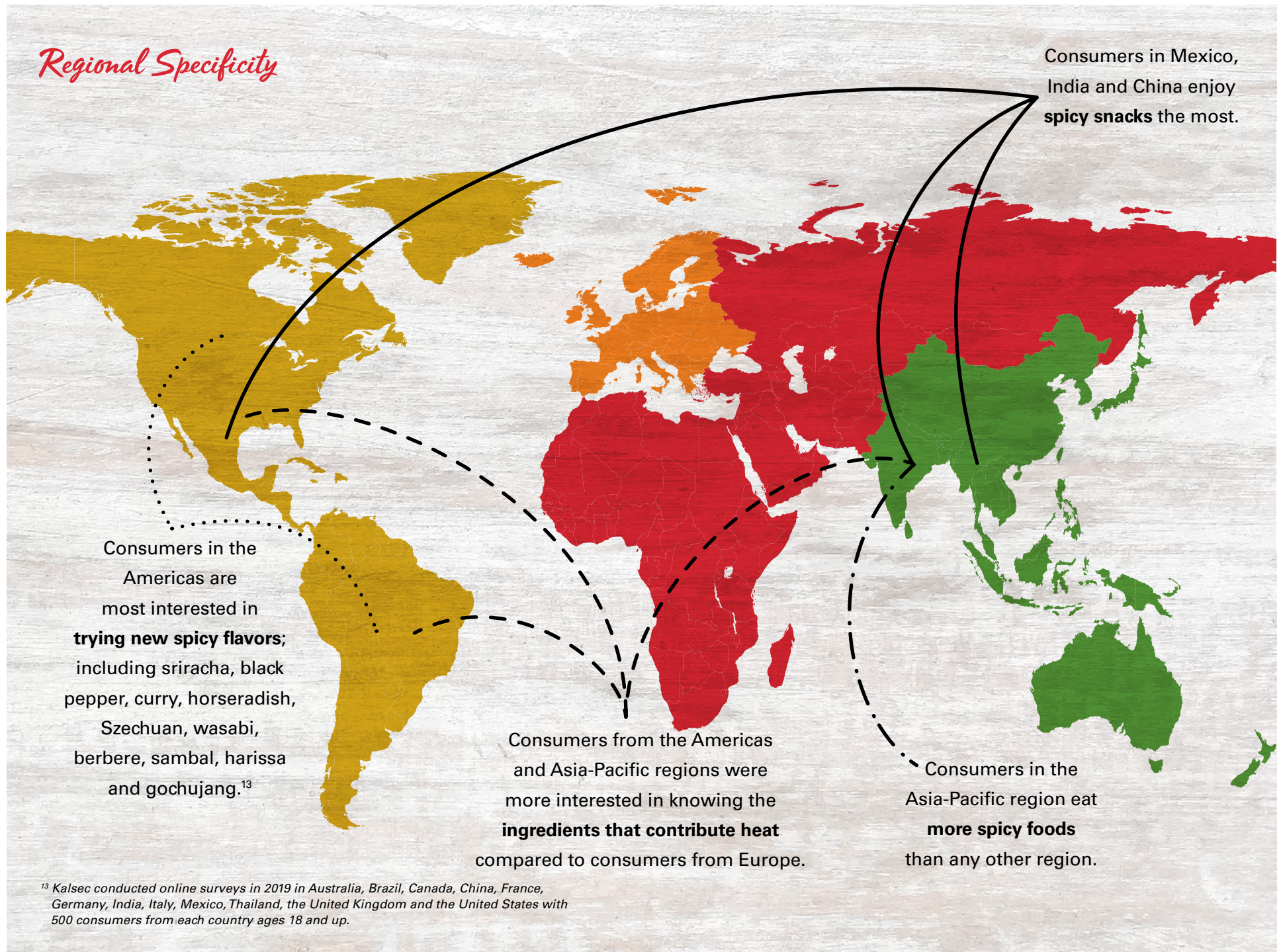
are more likely to order  
spicy foods when  
**dining out**  
and 54+ are the least likely age  
group to do so when dining out.



<sup>12</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.



## Regional Specificity







## Regional Insights: The Americas

U.S. and Canadian consumers prefer medium pungency levels.

**Mexican consumers prefer a hot heat level—the only country to claim this preference of all consumers surveyed.<sup>14</sup>**



**3 out of 4**  
**Mexican consumers**  
eat spicy  
foods as a **snack**.



**Mexican food**  
is the **most popular** spicy  
cuisine in **Canada**,  
Thai food is the second  
most popular.



**50% of Brazilian consumers**  
enjoy **medium** heat  
levels in foods that are  
meant to be spicy, more than  
any other country surveyed.



**3 out of 4**  
**Latin American**  
**consumers** eat spicy  
foods during **lunch**.

<sup>14</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.



## *Understanding Heat Delivery Differences*

A U.S. salsa manufacturer needed to ensure their products labeled 'mild,' 'medium' and 'hot' were representative of the targeted pungency intensity ranges. The manufacturer did not have the resources to conduct this research, so they sent samples of their salsa base and specification ranges to Kalsec for testing.

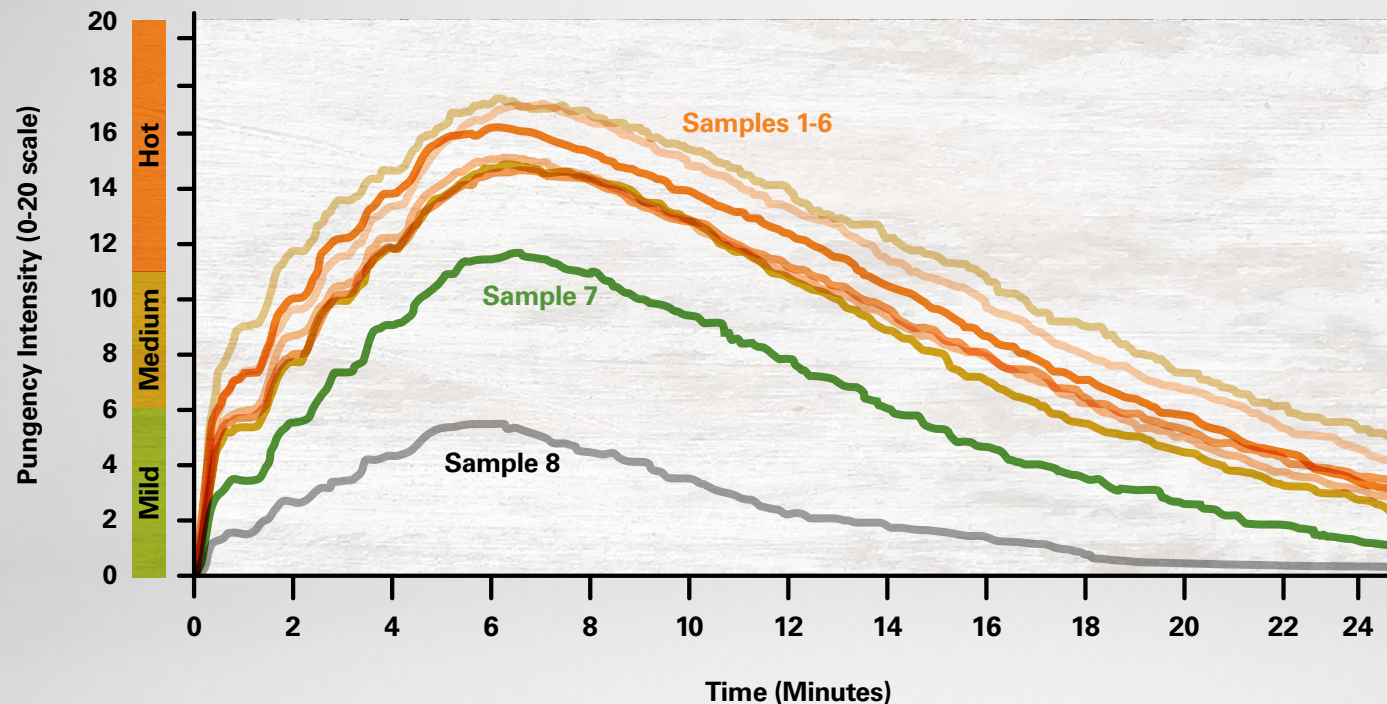
Analytical information determined areas where more or less heat was needed to achieve a specific pungency intensity level. Kalsec dosed the salsa base using ClearCap® Capsicum to achieve mild, medium and hot levels of pungency. Dosing levels were confirmed by Kalsec analytical scientists before performing a sensory triangle test. It was noted that consumer palates may be more sensitive to differences in mild salsa pungency than the more pungent levels typical of medium salsa and hot salsa.

With the help of Kalsec sensory and analytical teams, the salsa manufacturer was able to achieve their specification range with ClearCap® Capsicum to meet consumer expectations. The analytical and sensory testing helped the manufacturer better understand the differences in heat levels for salsa applications and provide a more consistent product.





## Understanding Heat Delivery Differences



This graph depicts the pungency intensity of eight U.S. salsa samples labeled 'hot' and the sensory ranges expected in the U.S. for products labeled 'mild,' 'medium' and 'hot' based on Kalsec data.<sup>15</sup> It is important for manufacturers to align front label claims with consumer expectation. As shown, **samples 1-6** cluster within a similar range of pungency intensity. **Sample 7** would be close but outside of common perceptions, and **sample 8** would not meet expectations for a 'hot' salsa in the U.S.

<sup>15</sup> Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.





## Regional Insights: Europe

The European market for spicy foods is diverse, with regional palates and perceptions varying greatly. The U.K. has a strong fascination with spicy curries whereas their French neighbors prefer more subtle flavors.



**93% of U.K. consumers** eat spicy foods at the **dinner meal**.<sup>16</sup>




**Italian consumers** were more likely than any other country surveyed to say they were willing to try **spicy sauces**, with **66%** saying they would be most likely to try sauces out of a range of food categories.



**53% of Germans** often choose spicy options when **dining out** at restaurants.

<sup>16</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.





“The French market is quite traditional. We prefer sweet spices and herbs. We don’t like too spicy. For example, a customer might prefer no heat chipotle over chipotle. Heat is used more as a subtle sensation to enhance the taste of food, not to make a burning effect.”

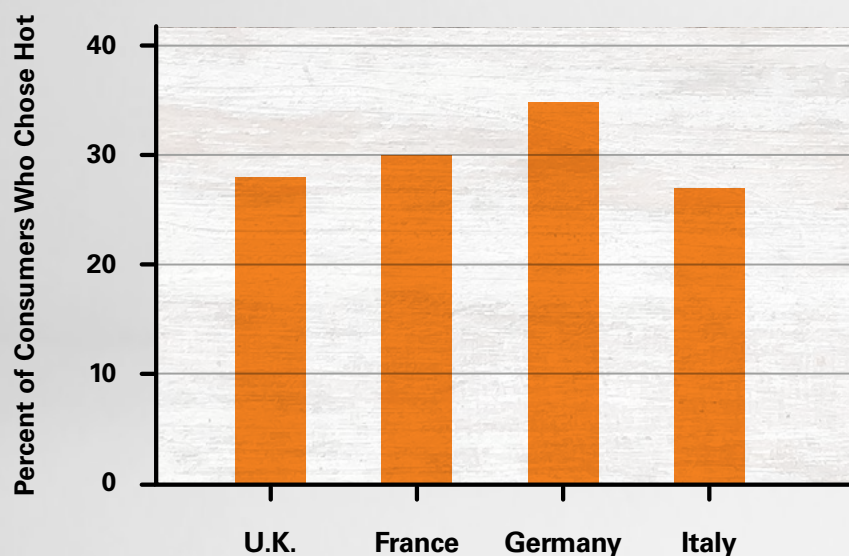
— Thomas Watrelot, Area Account Manager – France, Kalsec



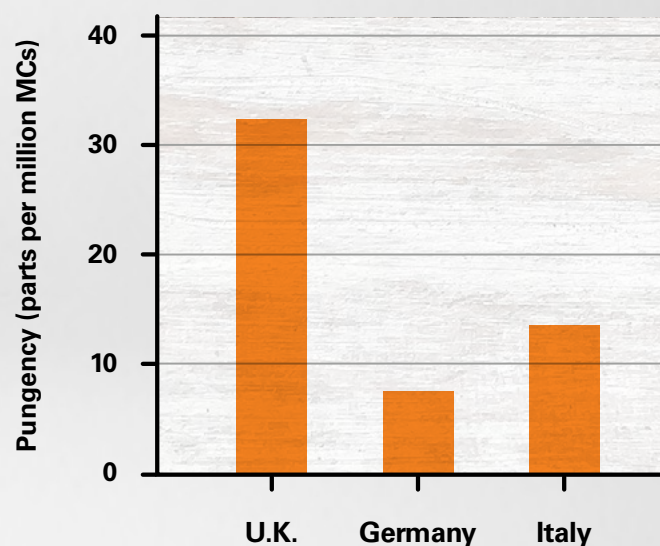
## Interpretations of Pungency

When asked which level of heat consumers enjoy in foods that are meant to be spicy, German consumers chose 'hot' more often than their British, Italian and French counterparts.<sup>17</sup> However, when testing pungency ranges, the German products that were labeled 'hot' had much lower pungency ranges than other European products. Two-thirds of the German products labeled as 'hot' profiled in the global mild-to-medium pungency range.<sup>18</sup>

**Consumers Who Chose Hot as Preferred Level of Heat in Foods Meant to be Spicy**



**Highest Pungency of Products Labeled Hot by Country**



<sup>17</sup>Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.

<sup>18</sup>Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.





## Regional Insights: Asia-Pacific

According to 2014 world production statistics, Asia is the world's largest producer of chili peppers.<sup>19</sup> Not surprisingly, consumers in the Asia-Pacific region of the world enjoy eating hot and spicy foods more than any other region.<sup>20</sup> Australian consumers are the exception and tend to have mild preferences.



**Australian consumers** prefer **mild** over medium pungency.



**Two-thirds of consumers** in the **Asia-Pacific region** often choose spicy options when cooking at **home** and when **dining out**.



**3 in 4 consumers** from the **Asia-Pacific region** eat spicy foods during **lunch** and **dinner**.

<sup>19</sup> Shisia, M. (2017, October 31). *The World's Top Chili Pepper Producing Countries*. Retrieved from <https://www.worldatlas.com/articles/the-world-s-top-chili-pepper-producing-countries.html>

<sup>20</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.





**Consumers from Thailand** are more likely than the global population to **cook with spicy ingredients** at home, with 64% saying they do so often or very often.<sup>21</sup>



Based on analytical and sensory data, samples from **Thailand** were rated **hotter** than their label indicated.<sup>22</sup>



**69% of Indian consumers** said they are eating spicier foods **more often** today than they were one year ago, higher than any other country surveyed.

<sup>21</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.

<sup>22</sup> Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.



When asked which spicy flavor combinations they were interested in trying, a majority of Chinese consumers chose **spicy and tangy**, with **59%** saying they were interested in trying the combination.





“Tangy means tart but pleasant. It is a little acidity that complements sweet and spicy flavors and foods.”

— Dr. Shane McDonald, Principal Flavor Chemist – U.S., Kalsec





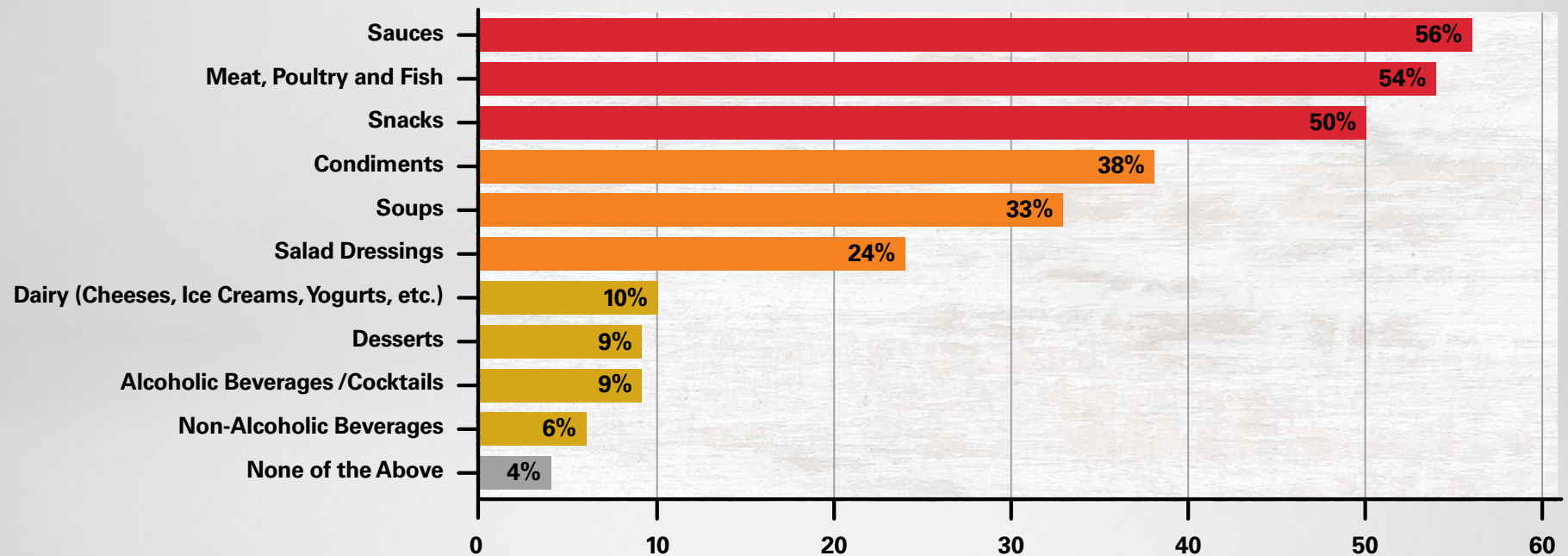
*Growing with Consumer Demand*



## Spicy Food Applications

Consumers are more likely to try savory foods that have traditionally been spicy, such as meat, poultry, sauces and snacks than they are to try products like desserts and beverages with spicy options.<sup>23</sup> Over 40% of consumers in India are extremely likely to try a new spicy beverage or dessert. This could be the beginning of a new trend.

### Foods Consumers Would be Most Likely to Try with a Spicy Option



<sup>23</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.





“In Europe we are increasingly looking to both Africa and Asia for flavor inspiration. Vietnamese, Korean, Moroccan, and ‘Middle Eastern’ foods all deliver different flavor profiles with blends of heat and spice to suit all tastes.”

— Paul Seymour, Director of Technical Services - U.K., Kalsec



## Pepper Varietals

As part of the trend for transparency across the food industry, consumers are looking for specific ingredients on labels and menus.<sup>24</sup> This includes the source of pungency, like the specific pepper varietal. In India, this is particularly pronounced. There, three out of four people agree that ingredients contributing to heat should be from a specific source.













**More than half**  
of global consumers  
agree that the  
**source of heat,**  
such as specific pepper  
varietal, matters to them.

<sup>24</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.













<i>Popular Peppers</i> <sup>25</sup>		<i>Heat Level</i>	<i>Description</i>
	Ancho (ahn-choh)	 Scoville Scale: 1,000-1,500	Dried version of the poblano chile. Mild in heat with sweet raisin notes rounded out by smoky tobacco and chocolatey undertones.  Origin: Mexico
	Guajillo (gwa-hee-yoh)	 Scoville Scale: 2,500-5,000	One of the most common chiles in Mexican cuisine and often used for harissa in North Africa. Unique tangy fruit flavor combined with paprika-style earthiness and mild heat.  Origin: Mexico
	Green Hatch (green hach)	 Scoville Scale: 1,000-8,000	This pepper is prized and very popular in Southwestern cuisine. Crisp green notes with mild pungency.  Origin: United States
	Jalapeño (hah-luh-peyn-yoh)	 Scoville Scale: 2,500-8,000	One of the most popular peppers in the U.S. Green and vegetal notes are followed by moderate heat.  Origin: Mexico
	Chipotle (chi-poht-ley)	 Scoville Scale: 2,500-8,000	Smoked version of the jalapeño. Smokiness is first and foremost.  Origin: Mexico

<sup>25</sup> Scoville ranges and country origins can be found at the following source: *The Hot Pepper List: Know Your Spice - 130 Chilies!* (2019, January 28). Retrieved from <https://www.pepperscale.com/hot-pepper-list/>.

<i>Mild</i>	<i>Medium</i>	<i>Hot</i>	<i>Extra Hot</i>
			



Popular Peppers <sup>26</sup>	Heat Level	Description
 <p>Serrano (suh-rah-noh)</p>	 <p>Scoville Scale: 10,000-23,000</p>	<p>Similar to the jalapeño with green flavor notes but increased heat level.</p> <p>Origin: United States</p>
 <p>Cayenne (kahy-en)</p>	 <p>Scoville Scale: 30,000-50,000</p>	<p>Sharply delivered heat with hay-like earthy notes.</p> <p>Origin: French Guyana</p>
 <p>Habanero (hah-buh-nair-oh)</p>	 <p>Scoville Scale: 100,000-500,000</p>	<p>High heat, but with a balanced floral and fruity body which delivers sweet notes overall.</p> <p>Origin: South America</p>
 <p>Ghost (gohst)</p>	 <p>Scoville Scale: 1,000,000+</p>	<p>The hottest commercially produced pepper with fruity undertones that follow the intense heat.</p> <p>Origin: India</p>

<sup>26</sup> Scoville ranges and country origins can be found at the following source: *The Hot Pepper List: Know Your Spice - 130 Chilies!* (2019, January 28). Retrieved from <https://www.pepperscale.com/hot-pepper-list/>.

<i>Mild</i>	<i>Medium</i>	<i>Hot</i>	<i>Extra Hot</i>
			




## *Tasty Combinations*

Globally, consumers are most interested in trying **spicy/salty** combinations, followed by **spicy/sweet** and **spicy/tangy** combinations.<sup>27</sup> That means the food matrix matters to the overall experience of the pungency.

Peggy Iler, Kalsec Senior Manager and Lead Scientist in the U.S., supports this trend. “We are going beyond a single dimension of heat to one with added flavors, whether that be sweet, citrus or tangy,” she said.

Her favorite combination is cardamom citrus heat. “The difference in flavor delivery and heat expression is incredible in different applications. Just the other day, I saw our local donut shop was featuring a curry cardamom donut,” said Iler.



“Differences among food matrices and composition can affect how pungency is perceived. High levels of sweetness can decrease the perception of pungency.”

— Robin Boyle,  
Sensory Manager - U.S., Kalsec

<sup>27</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom, and the United States with 500 consumers from each country ages 18 and up.



## Tasting with Your Eyes

Consumers make their first judgments about food based on appearance and confirm their judgments with taste and smell. The interaction between appearance, smell and taste is pivotal to the success of a product, and each aspect should be considered when developing new products. In the case of hot and spicy foods, consumers have predetermined ideas of what a hot or spicy food should look like. This means that the appearance of a spicy food is almost as important as the heat level and flavor.



<sup>28</sup> Kalsec conducted online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom, and the United States with 500 consumers from each country ages 18 and up.

<sup>29</sup> McDonald ST. A review of color flavor interaction in food and its application in food product development. *Adv Food Technol Nutr Sci Open J.* 2018; 4(1): 23-27. doi: 10.17140/AFTNSOJ-4-149.



**70%** of consumers  
would believe a red sauce  
to be the spiciest when presented  
with red, yellow, green  
and orange sauces.<sup>28</sup>

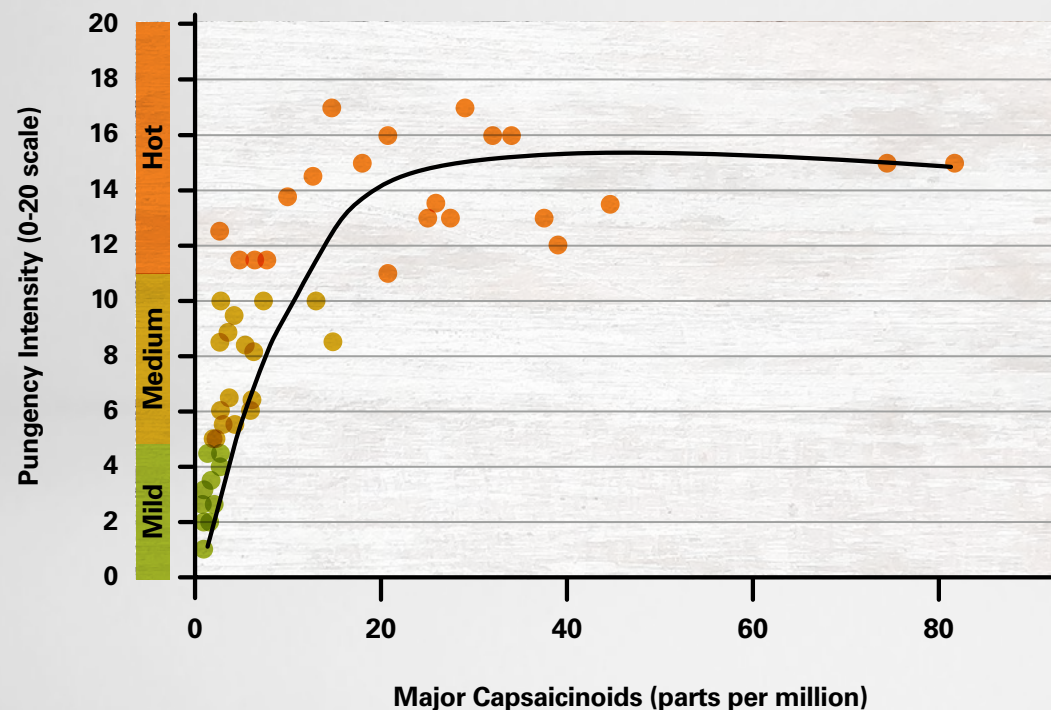
Flavor is mostly determined by sight and ortho-nasal (aroma—outside in) olfaction, to create an expectation of what a food will taste like, and it is confirmed by taste (on the tongue) and retro-nasal olfaction (from the mouth through the nose). Colors that create the correct expectation of a flavor are called “congruent” and colors that create incorrect expectations are termed “incongruent.” Studies show that the ability to correctly identify flavor is increased considerably if the color is congruent with the flavor. Congruently colored foods have been shown to increase the perception of pungency in salsa.<sup>29</sup>



## Sensory Plateau for Pungency: Extreme Heat

Extreme heat products have an attraction, with a 'can you handle it?' challenge. Can consumers really taste the difference between hot sauces claiming 500,000 and 1,000,000 Scoville Heat Units (SHUs), respectively?

Based on the products Kalsec evaluated by both analytical and sensory methods, a sensory plateau to pungency may be occurring. There seems to be a point at which the maximum pungency intensity (measured by the Kalsec sensory panel) ceases to increase while analytical methods can accurately measure capsaicinoid concentrations regardless of perceived pungency.<sup>30</sup>



This scatterplot shows the relationship between pungency intensity and parts per million (ppm) major capsaicinoids (MCs) for hot and spicy food sauces collected from nine countries. The mild and medium samples follow a more linear relationship while the pungency intensity of the hot samples appears to reach a maximum upper limit around 16 (0-20 scale), indicating a possible sensory plateau to pungency.

<sup>30</sup> Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.



# Conclusions



We see significant growth in interest and consumption of hot and spicy foods in 2019, specifically in familiar savory foods. Consumers want specificity when it comes to ingredients, peppers and authentic flavor profiles. There is also potential for complexity with spice in different flavor combinations, and for niche products like desserts and beverages.



Regional differences occur in the perceived definition of heat levels, so delighting consumers includes understanding these nuanced differences and which audience products are targeting. A product labeled 'hot' might have a different meaning and consumer perception in India versus Germany.



As a global standard, hot and spicy ingredients and flavors provide many options for food processors, manufacturers and CPG companies to innovate and extend product lines. Kalsec is an expert in heat and is willing to support your formulations to reach your consumer's preferred level of heat. We know heat better than anyone.



## About Kalsec®

Kalsec is a pioneer in both the extraction of peppers and the use of gas chromatography for the analysis of spice extracts. Kalsec got its start in the development of chili pepper extraction products when Paul Todd Sr. purchased ten railcar loads of Carolina Long Chiles below market price many years ago. Paul Todd Jr. worked with Hungarian flavor chemist, Dr. Maria Mauritz, to extract the heat from the peppers and create their first capsicum extracts.

As consumer trends develop, and the desire for more specialized heat and peppers grows, Kalsec maintains its innovative research and development efforts to provide creative solutions to our customers' challenges.

Kalsec was founded on innovation and is a leader in revolutionizing the food ingredient industry. Our expertly crafted ingredients combine naturally sourced materials with insights and technical expertise. This unique combination has positioned us as the trusted partner that food and beverage manufacturers turn to for quality, reliability and consistency. **Learn more at [kalsec.com](https://www.kalsec.com).**

## Methodology

Kalsec performed consumer trend analysis by conducting online surveys in 2019 in Australia, Brazil, Canada, China, France, Germany, India, Italy, Mexico, Thailand, the United Kingdom and the United States with 500 consumers from each country ages 18 and up.

Kalsec performed market product analysis. Spicy food products from Australia, Canada, China, Germany, India, Italy, Thailand, the United Kingdom and the United States were analyzed in Kalsec laboratories to evaluate the pungency level, measured by major capsaicinoids (MCs). These products included national and private label brand chili sauces, salsas and ketchups, depending on typical regional consumption of hot and spicy foods. These same products were evaluated by the Kalsec sensory panel to measure pungency intensity.