



**POLIANA BERGAMIN ATHAYDE DE SOUZA**

**PREFERÊNCIAS E PERCEPÇÕES DE CONSUMIDORES EM  
RELAÇÃO ÀS ALEGAÇÕES NUTRICIONAIS E  
INGREDIENTES DE SNACKS DOCES COM APELO DE  
SAUDABILIDADE**

**LAVRAS-MG  
2022**

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DE SAUDABILIDADE**

Tese apresentada à Universidade Federal de Lavras, como parte das exigências do Programa de Pós-graduação em Ciência dos Alimentos, para obtenção do título de Doutora.

Professor João de Deus Souza Carneiro  
Orientador

**LAVRAS-MG  
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**CONSUMER PREFERENCES AND PERCEPTIONS TOWARDS NUTRITION CLAIMS  
AND INGREDIENTS OF SWEET SNACKS WITH HEALTH APPEAL**

Tese apresentada à Universidade Federal de Lavras, como parte das exigências do Programa de Pós-graduação em Ciência dos Alimentos, para obtenção do título de Doutora.

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2022**

*A DEUS, que em sua infinita misericórdia  
sustenta e fortalece a todos que nele confiam*

*DEDICO.*

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A Deus pai, criador de tudo.

Ao seu filho Jesus Cristo, nosso único salvador.

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*“O meu povo foi destruído, porque lhe faltou o conhecimento...”*  
Oséias 4:6

## RESUMO GERAL

O interesse da população por uma dieta mais saudável tem aumentado nos últimos anos. Neste contexto, a fim de satisfazer as demandas dos consumidores com orientação para a saúde e para o bem-estar, este estudo objetivou identificar e compreender os diferentes perfis destes consumidores, bem como suas preferências e percepções em relação às alegações nutricionais (artigo 1) e ingredientes (artigo 2) de doces e sobremesas embalados e prontos para consumo (*snacks*), com apelo de saudabilidade. Realizou-se um estudo descritivo, com uma abordagem quantitativa, por meio de questionário online, com a participação de 520 respondentes. A partir dos dados obtidos, duas diferentes análises de agrupamentos foram realizadas. Na primeira análise, três grupos de consumidores orientados à saúde e ao bem-estar (A1, B1 e C1) foram identificados, por meio de seus diferentes níveis de interesse e preferência por alegações nutricionais e disposição para pagar a mais por doces e sobremesas com estas alegações no rótulo (artigo 1). Os grupos A1 e C1, representando 79% de todos os entrevistados, apresentaram elevado nível de interesse geral por alegações nutricionais. O grupo B1, com menor nível de interesse por alegações, relatou ter uma alimentação menos saudável, sugerindo que os hábitos alimentares possam ter impacto sobre o nível de interesse por alegações e que quanto melhor os hábitos alimentares maior seria o interesse por produtos com estas informações. A maior parte dos consumidores dos três grupos mostrou-se disposta a pagar a mais por doces e sobremesas que contivessem alegações de sua preferência no rótulo. As alegações associadas com redução/ausência do conteúdo de gorduras e açúcares foram as que, para todos os grupos, estiveram entre as mais interessantes e preferidas, respectivamente. Na segunda análise de agrupamento três grupos de consumidores orientados à saúde e ao bem-estar (A2, B2 e C2) foram identificados, por meio das suas diferentes motivações de escolhas alimentares e autopercepções em relação à própria dieta, nível de atividade física, peso e composição corporal (artigo 2). O grupo B2, maior grupo, diferenciou-se dos demais por realizar escolhas alimentares motivadas principalmente pelo fator "qualidade de vida". As escolhas alimentares dos grupos A2 e C2 foram mais motivadas pelos fatores "Peso" e "Estética", respectivamente. Os três grupos preferiram produtos elaborados com ingredientes naturais e apresentaram maior rejeição por produtos elaborados com aditivos ou com muitos ingredientes. Ingredientes orgânicos (principalmente para os grupos A2 e B2), substitutos naturais do açúcar (principalmente para os grupos A2 e C2), e proteicos (principalmente para o grupo C2) também estiveram entre os preferidos para elaboração de doces e sobremesas. Com base nos resultados desta pesquisa, conclui-se que uma nova geração de produtos com teor reduzido de açúcar e gordura, elaborados com poucos ingredientes e ingredientes naturais, pode portanto ser uma das respostas mais promissoras dos fabricantes de *snacks* doces à crescente procura por alimentos mais saudáveis.



**Palavras-chave:** Comportamento do consumidor. Pesquisa de mercado. Perfil do consumidor. Rotulagem de alimentos. Alimentação saudável. Alimentos embalados. Ingredientes.

## ABSTRACT

The population interest in a healthier diet has increased in recent years. In this context, in order to meet the demands of consumers with health and wellness orientation, this study aimed to identify and understand the different profiles of these consumers, as well as their preferences and perceptions regarding the nutritional claims (article 1) and ingredients (article 2) of packaged ready-to-eat sweets and desserts (snacks), with health appeal. A descriptive study was carried out, with a quantitative approach, by means of an online questionnaire, with the participation of 520 respondents. From the data obtained, two different cluster analyses were performed. In the first analysis, three groups of health and wellness-oriented consumers (A1, B1 and C1) were identified, through their different levels of interest and preference for nutrition claims and willingness to pay extra for sweets with these claims on the label (Article 1). Groups A1 and C1, representing 79% of all respondents, showed a high level of general interest in nutrition claims. Group B1, with the lowest level of interest in claims, reported a less healthy diet, suggesting that eating habits have a strong impact on the level of interest in claims and that the better the eating habits, the greater the interest in products with nutrition claims. Most consumers in all three groups were willing to pay more for sweets and desserts that had their preferred claims on the label. Claims associated with reduced/no fat and sugar content were among the most interesting and preferred claims for all groups, respectively. In the second cluster analysis three groups of health and wellness-oriented consumers (A2, B2 and C2) were identified, through their different motivations for food choice and self-perceptions regarding their own diet, level of physical activity, weight and body composition (Article 2). Group B2, the largest group in the survey, differed from the others in making food choices motivated primarily by the "quality of life" factor. The food choices of groups A2 and C2 were more motivated by "weight" and "aesthetics" factors, respectively. All three groups preferred products made with natural ingredients and had a greater rejection of products made with additives or too many ingredients. Organic ingredients (mainly for groups A2 and B2), natural sugar substitutes (mainly for groups A2 and C2), and protein (mainly for group C2) were also among the most preferred ingredients for packaged sweets and desserts. Based on the findings of this research, it is concluded that a new generation of products with reduced sugar and fat content, made with few ingredients and natural ingredients, may therefore be one of the most promising responses by manufacturers of sweet snacks to the growing demand for healthier foods.

**Keywords:** Consumer behavior. Market research. Consumer profile. Food labeling. Healthy eating. Packaged foods. Ingredients.

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## **PRIMEIRA PARTE**

## 1. INTRODUÇÃO (SEÇÃO PRIMÁRIA)

O aumento do interesse da população por um estilo de vida mais saudável tem impulsionado a consolidação de um nicho de mercado que busca cada vez mais por produtos saudáveis (NIELSEN, 2016; EUROMONITOR, 2018). Esse nicho é formado por consumidores orientados para a saúde e para o bem-estar, que se interessam por informações relacionadas à nutrição, às dietas e ao valor nutritivo dos alimentos (STOK, et al., 2018; MARTINS, 2019; ITAL, 2020).

A fim de acompanhar as demandas desse mercado consumidor, as empresas alimentícias globais têm desenvolvido produtos com propostas de valor relacionadas com a saúde e o bem-estar (EUROMONITOR, 2018; SEBRAE, 2019, 2020; ITAL, 2020). Dentre as principais tendências, podemos destacar as categorias de produtos denominadas "clean-label", "free-from", "naturalmente saudáveis", "orgânicos", "fortificados", "funcionais", "veganos", "à base de plantas", entre outras (SETHI et al., 2016; JONATHAN et al., 2017; EUROMONITOR, 2018; MARTINS, 2019; SCHNETTLER et al., 2019; ITAL, 2020).

O mercado de alimentos prontos para consumo, que se enquadram na categoria "indulgência sem culpa", também tem se tornado uma tendência global. Essa categoria é composta por produtos saborosos, geralmente fornecidos em pequenas porções (snacking/finger food), com apelos nutricionais, reduzidos em calorias e adicionados de ingredientes saudáveis e/ou funcionais (EUROMONITOR, 2018; ITAL, 2020; SCHLINKERT et al., 2020).

Em meio a estas tendências de consumo, um setor que tem ganhado destaque e que revela enorme potencial para aqueles que desejam empreender no segmento de alimentos saudáveis, é o de doces e sobremesas (SEBRAE, 2021). Para investir nesse setor, no entanto, é necessário que fabricantes tenham profundos conhecimentos sobre as diferentes demandas do mercado consumidor, o processo de desenvolvimento de novos produtos, ingredientes e aditivos (SEBRAE, 2019).

Durante o processo de desenvolvimento de novos produtos com apelo à saudabilidade, como doces e/ou sobremesas embalados, é necessário que fabricantes saibam informar aos consumidores alvos, de maneira adequada, através dos rótulos frontais, os atributos positivos do produto (STEINHAUSER, JANSSEN, & HAMM, 2019; BALLCO, et al., 2019; ANNUNZIATA; MARIANI 2019; JÁUREGUI, 2020). Para que esta comunicação seja clara, objetiva e assertiva, é imprescindível que estas informações estejam alinhadas com os diferentes perfis de consumidores, bem como seus interesses e comportamentos de escolha alimentar (CARELS et al., 2007; LÄHTEENMÄKI, 2013; SANTERAMO et al., 2018; FRASER, 2018; STEINHAUSER, JANSSEN; HAMM, 2019; BALLCO, et al., 2019).

Apesar das diversas tentativas em elucidar o comportamento do consumidor, sabe-se que o processo de escolha alimentar é um mecanismo altamente complexo e de difícil compreensão, que vai muito além de uma simples questão nutricional (STEINHAUSER et al., 2019; PINTO et al., 2021). Os modelos de escolha alimentar demonstram, por exemplo, que os indivíduos tendem a fazer suas escolhas levando em consideração os fatores que lhes são pessoalmente mais importantes (SOBAL; BISOGNAL, 2009).

Neste sentido, os fabricantes devem levar em consideração o bem-estar e as preferências e necessidades de cada tipo de consumidor, uma vez que as escolhas alimentares humanas, bem como a percepção que cada indivíduo tem sobre "alimentação saudável" são subjetivas e influenciadas por muitos fatores, incluindo motivações e interesses pessoais (PAQUETTE, 2005; CARELS et al., 2007; MONTERROSA et al., 2020; PINTO et al., 2021).

Quando se trata de alimentação saudável, variáveis que levem em conta aspectos relacionados com o conhecimento nutricional do indivíduo e sua motivação para saúde, qualidade de vida e bem-estar em geral, estão entre as mais importantes em estudos sobre o comportamento dos consumidores, uma vez que têm grande impacto na percepção da saudabilidade dos alimentos ou na forma como as informações ou alegações nutricionais do rótulo são interpretadas (MILLER; CASSADY,

2015; BIALKOVA et al., 2016; FENKO et al., 2016; HUNG et al., 2017; ASIOLI et al., 2017; STEINHAUSER; et al., 2019; ANNUNZIATA; MARIANI 2019).

Estudos contemplando variáveis como as citadas acima são extremamente importantes, pois fornecem aos fabricantes de alimentos, incluindo os novos e pequenos empresários, informações que auxiliam na adequada reformulação e/ou no desenvolvimento de novos produtos mais saudáveis e capazes de satisfazer efetivamente as expectativas do mercado consumidor. Ao mesmo tempo estas informações podem facilitar a comunicação entre fabricantes e consumidores, facilitar o processo de escolha alimentar, e auxiliar na elaboração de políticas públicas de promoção da saúde e de mudanças hábitos (YU-HUA, 2008; JOMORI et al., 2008; ASIOLI et al., 2017; ANNUNZIATA; MARIANI 2019; STEINHAUSER et al., 2019).

Neste contexto, este estudo visou identificar e compreender os diferentes perfis de consumidores orientados para a saúde e para o bem-estar e elucidar suas preferências e percepções em relação aos ingredientes e alegações nutricionais de doces e sobremesas com apelo de saudabilidade.

## **2. REFERENCIAL TEÓRICO (SEÇÃO PRIMÁRIA)**

### **2.1 Mercado de alimentos saudáveis**

A industrialização de alimentos e o consumo de alimentos industrializados fazem parte da cultura humana moderna, sendo fundamentais para a segurança alimentar da população mundial que já ultrapassa os 7 bilhões de indivíduos, e que estima-se atingir, até 2050, 9,8 bilhões de pessoas (FAO, 2017).

O problema associado ao elevado consumo de alimentos industrializados se deve ao fato de que, em grande parte das vezes, estes produtos são produzidos com excesso de nutrientes potencialmente prejudiciais à saúde, como açúcares, sódio e gorduras (MONTEIRO, et al., 2018; BAKER, 2020; WHO, 2019; BAKER, 2020).

A fim de atender às novas demandas de mercado, empresas globais do setor de alimentos estão sendo impulsionadas para a adoção de novos valores corporativos, com maior consciência social e maior compromisso com a saúde e bem-estar do consumidor (EUROMONITOR, 2018). Tais mudanças tendem a gerar grandes oportunidades de geração de riqueza (EUROMONITOR, 2018; EUROMONITOR, 2019).

A nível global, o segmento de alimentação saudável tem crescido 1,8% ao ano e em 2018 correspondeu a 20% do mercado de alimentos (EUROMONITOR, 2019). No Brasil, o mercado de alimentação saudável está entre os mais promissores e cresce a uma taxa média de 12,3% ao ano (SEBRAE, 2018). Segundo pesquisa da Euromonitor Internacional, o mercado nacional de alimentos e bebidas saudáveis cresceu 58,3% entre 2012 e 2017, e em 2019, o Brasil ocupou a quarta colocação mundial no ranking de vendas desse mercado, que movimentava cerca de US\$ 35 bilhões por ano (EUROMONITOR, 2019). Nas indústrias alimentícias, os setores responsáveis pelo desenvolvimento de alimentos e bebidas saudáveis cresceram mais de 12% em 2018 (SEBRAE, 2019).

A procura por produtos integrais, sem lactose, sem glúten, sem corantes artificiais, sem conservantes, fortificados, ricos em fibras e proteínas, reduzidos ou



isentos de gordura, sódio e açúcar, pouco calóricos, *light*, *diet*, entre outros, é uma tendência global nos mercados desenvolvidos e emergentes (JONATHAN et al., 2017; EUROMONITOR, 2018; SCHNETTLER et al., 2019).

A busca por produtos saudáveis, tem aberto espaço no mercado para as categorias de produtos denominados “clean label”, “free from”, “naturalmente saudáveis”, “orgânicos”, “fortificados/funcionais”, “veganos”, “plant based”, etc. (SETHI et al., 2016; JONATHAN et al., 2017; EUROMONITOR, 2018; SCHNETTLER et al., 2019; ITAL, 2020). Sendo a categoria “free from” uma das que apresenta maior crescimento no setor de alimentos industrializados (EUROMONITOR, 2018).

Uma outra tendência que se destaca é a categoria “indulgência sem culpa”, que se destina principalmente a lanches rápidos, práticos e saborosos, fornecidos em porções menores (snacking/finger food), que possuem apelos nutricionais voltados para a saúde e bem-estar. Geralmente são alimentos comercializados nas versões “zero”, “light”, “baixo ou reduzido em açúcares ou gorduras...”, etc. (DOMICIANO et al., 2018; EUROMONITOR, 2018).

Além das exigências dos consumidores, que vêm moldando essas tendências alimentares mundiais, cabe mencionar que as indústrias alimentícias são também pressionadas, por meio de regulamentações e termos de compromissos governamentais, a produzir alimentos mais saudáveis, principalmente reduzidos em açúcares, gorduras saturadas e sódio (TABISH, 2017; BRASIL, 2018; MINISTÉRIO DA SAÚDE DO BRASIL, 2018; ANVISA, 2020).

Para sobreviver a todas essas pressões, à concorrência e à dinamicidade deste mercado, a indústria alimentícia deve apostar cada vez mais no desenvolvimento de novos produtos e/ou na reformulação dos produtos existentes (SAFRA, 2020). É essencial que se reduza o uso de ingredientes potencialmente prejudiciais à saúde e que se invista no uso de ingredientes menos processados, com mais vitaminas e que sejam percebidos como mais saudáveis (WHO, 2019; ITAL, 2020; BAKER, 2020).

A empresa Barilla®, por exemplo, tem como meta até o ano de 2030 garantir que pelo menos 30% de seus produtos contenham ingredientes integrais e que sejam

ricos em fibras e proteínas. Já a Coca-Cola®, no período 2015-2017, reformulou 27 produtos do seu portfólio. Além disso, no ano de 2017, reduziu o teor de açúcar adicionado em 17 bebidas, além da adição de vitaminas e minerais (ITAL, 2020).

A kraft heinz® tem como meta incluir nos seus produtos nutrientes como cálcio, fibra e ferro, além de ingredientes como legumes, frutas e grãos integrais, oferecendo opções naturais, orgânicas e/ou sem aditivos artificiais (ITAL, 2020). Já a Pepsico® tem como meta para 2025, ter um portfólio com mais de 26,6% em produtos contendo ingredientes como: grãos integrais, frutas, verduras e proteínas. Outras empresas como General Mill®, Unilever®, Mondelez Internacional®, Mars® também possuem metas para melhoria dos produtos dos seus portfólios (ITAL, 2020).

Em resposta à crescente procura e oferta de alimentos com apelo à saudabilidade, observa-se também, o aumento do número de estabelecimentos especializados no comércio de produtos naturais/ saudáveis (SEBRAE, 2019). Neste segmento destaca-se a franquia Mundo Verde, que segundo a ABF (Associação Brasileira de Franchising), é a maior rede de lojas de produtos saudáveis/naturais da América Latina (ABF, 2017). A franquia, que em 2013 contava com 107 lojas no Brasil, hoje conta com mais de 380, alcançando um público estimado de 120 mil pessoas (ABF, 2013; HECK, 2020). A maior parte do seu público-alvo são pessoas orientadas à saúde e ao bem-estar, que buscam uma alimentação mais saudável e balanceada (HECK, 2020).

O perfil dos consumidores dessas lojas é composto principalmente por mulheres entre 25 a 50 anos e pessoas com alguma necessidade dietética específica (veganos, vegetarianos, diabéticos, celíacos, intolerantes ao glúten e/ou lactose, etc.) (HECK, 2020). Esses consumidores, geralmente, possuem maior poder aquisitivo, gostam de praticar atividades físicas, buscam ter uma alimentação saudável e evitam produtos adicionados de ingredientes artificiais (SEBRAE, 2019).

Nestes estabelecimentos são comercializados os mais variados tipos de produtos alimentícios denominados “saudáveis”, dentre os quais encontram-se também os doces e/ou sobremesas com apelo à saudabilidade.

## 2.2 Mercado de doces e sobremesas saudáveis

Dentre os diversos segmentos alimentícios em expansão, o de doces e sobremesas saudáveis é um dos que mais se destaca (EUROMONITOR, 2019). O consumo habitual e elevado destes produtos refletem diretamente no faturamento do segmento, que supera 10 bilhões de reais ao ano no país (EUROMONITOR, 2019).

Nesta categoria de produtos, encontram-se os chocolates, produtos de panificação em geral como bolos, cookies, biscoitos, brownies, cupcakes, e tortas doces, sorvetes e gelatos, doces de leite, doces de frutas, barras de cereal, doces em pasta e creme, dentre outros (TECHNOMIC, 2017, 2018, 2019; EUROMONITOR, 2019; SEBRAE, 2018, 2019, 2021).

Uma pesquisa realizada pela Fiocruz (Fundação Oswaldo Cruz), em parceria com a UFMG (Universidade Federal de Minas Gerais) e a Unicamp (Universidade Estadual de Campinas), entrevistou 44.062 brasileiros entre abril e maio de 2020 e mostrou que quase 2/3 (63%) dos brasileiros consome doce e chocolates duas vezes ou mais por semana, sendo a maioria desses indivíduos mulheres (FIOCRUZ, 2020).

Segundo um relatório canadense sobre tendências de consumo de sobremesas, publicado em 2018, esses produtos são consumidos, cada vez mais, ao longo do dia e na forma de lanches rápidos (TECHNOMIC, 2018). Essa mudança de consumo, indica também, oportunidades no ramo de sobremesas prontas para o consumo, que conferem maior conveniência e praticidade ao consumidor (TECHNOMIC, 2018).

Apesar do setor de doces e sobremesas estar em franca expansão, sabe-se no entanto que estes produtos, em suas versões tradicionais, contribuem significativamente para o aumento da ingestão de açúcares pela população (ELLIOTT, 2011; SHAPIRO et al., 2011). O elevado consumo de açúcares, por sua vez, eleva o risco de incidência de doenças crônicas não transmissíveis, principalmente diabetes (WHO, 2015). Segundo Pesquisa do Ministério da Saúde do Brasil, o percentual de casos de diabetes aumentou 54%, entre os anos de 2006 e 2017 (ANVISA, 2018; BRASIL, 2020a).

O consumo habitual e elevado de doces e sobremesas em todo o mundo (EUROMONITOR, 2019; FIOCRUZ, 2020;), somado aos riscos que o consumo excessivo destes alimentos podem trazer (WHO, 2015; ANVISA, 2018) e o maior interesse do consumidor moderno por um estilo de vida mais saudável (ITAL, 2020), tem promovido a expansão do mercado de doces e sobremesas com apelo de saudabilidade (TECHNOMIC, 2017; SEBRAE, 2021).

O mercado de doces e sobremesas saudáveis é uma tendência mundial (TECHNOMIC, 2017). Atualmente são diversas as opções de produtos ofertados no mercado sem adição de açúcares, sem lactose, sem conservantes, sem glúten e sem corantes ou aromatizantes artificiais (TECHNOMIC, 2017; SEBRAE, 2018; SEBRAE, 2019).

De acordo com o relatório de tendências do consumidor de sobremesas, publicado em 2017, as sobremesas sem aditivos, conservantes e glúten, por exemplo, estão ganhando mercado (TECHNOMIC, 2017). Essas sobremesas são comercializadas como mais saudáveis e são destinadas a atender consumidores preocupados com a saúde (TECHNOMIC, 2017).

Frente a estas tendências, as empresas mundiais líderes no setor de chocolates, doces, guloseimas e snacks também têm buscado, cada vez mais, se adaptar às novas exigências do mercado consumidor, o qual demanda produtos mais saudáveis (TECHNOMIC, 2019; ITAL, 2020).

A multinacional norte-americana Hershey's®, por exemplo, tem como meta utilizar somente ingredientes naturais em seus chocolates, passando a ofertar apenas produtos sem conservantes, aromatizantes, edulcorantes e/ou corantes artificiais (ITAL, 2020). A empresa Italiana Ferrero®, especializada em chocolates e guloseimas, desde 2017, trabalha para incluir fibras e frutas desidratadas em seus produtos, sendo que a empresa também não utiliza mais gorduras hidrogenadas e tem buscado reduzir o teor médio de açúcares dos seus produtos (ITAL, 2020).

A marca de chocolates britânica Thorntons®, pertencente à Ferrero®, reduziu em 4% o teor de açúcares de seus produtos. A Mondelez International, líder mundial

em snacks, planeja reduzir em 5% o teor de açúcares de produtos pertencentes às marcas Milka®, Oreo® e Green & Black's® (ITAL, 2020). A transnacional suíça Nestlé, também reduziu em 7% o conteúdo de açúcares dos chocolates KitKat® (ITAL, 2020).

Apesar de ser um mercado promissor, a maioria dos estabelecimentos brasileiros que comercializam doces embalados (76%), ainda não comercializa produtos com apelo de saudabilidade. Nesses estabelecimentos, apenas alguns produtos com apelo à saudabilidade são comercializados, com destaque para produtos sem lactose, diet e sem glúten (SEBRAE, 2019). Dessa forma, de acordo com o Sebrae, o momento é oportuno para micro e pequenos empresários que desejam empreender neste segmento e que se interessam pelas demandas do mercado e pelo processo de desenvolvimento de novos produtos (SEBRAE, 2019).

Frente ao cenário promissor, diversas empresas brasileiras têm aproveitado para desenvolver e fabricar doces e sobremesas com apelo à saudabilidade. Dentre elas estão a Flormel®, MaisFit®, Haoma®, Food4fit Brasil®, entre outras (FLORMEL, 2022; MAISFIT, 2022; FOOD4FIT, 2022; AMOHAOMA, 2022). Já é possível identificar no portfólio dessas empresas uma grande variedade de opções de novos produtos que visam substituir as opções de doces e sobremesas tradicionais. São produtos enriquecidos com proteínas, fibras, vitaminas e minerais, sem a presença de lactose e glúten, reduzidos ou isentos de açúcares e gorduras, etc. (FLORMEL, 2022; MAISFIT, 2022; FOOD4FIT, 2022; AMOHAOMA, 2022).

Com a expansão desse mercado, observa-se também o surgimento de diversas pesquisas com o objetivo de estudar e desenvolver doces e sobremesas mais saudáveis, formulados a partir de ingredientes tipicamente brasileiros (BRANDÃO et al., 2020; CORDEIRO et al., 2020; CRUZ; GUIMARÃES, 2020).

Por fim, cabe mencionar que o termo "saudável" ainda não é totalmente elucidado para produtos alimentícios, nesse sentido, é importante compreender como os consumidores definem, percebem, compreendem e se comportam diante de tais produtos, de modo a que as suas exigências possam ser entendidas e satisfeitas pela indústria alimentar (PINTO et al., 2021).

### **2.3 Comportamento do consumidor de Alimentos**

O comportamento do consumidor compreende todos os processos relacionados ao ato de pesquisar, comprar, usar, avaliar e dispor de produtos e serviços (ENGEL et al., 2000). Entender este comportamento é portanto de grande interesse para todos que, por diferentes razões, desejam influenciar ou mudar tal comportamento (SCHIFFMAN e KANUK, 2000).

Sendo assim, compreender o comportamento do consumidor e suas escolhas alimentares é relevante não apenas para as indústrias alimentícias, mas para todos que desejam promover a saúde pública global, uma vez que as principais doenças crônicas não transmissíveis (DCNTs) poderiam ser, pelo menos em parte, evitadas por hábitos alimentares mais saudáveis (WHO, 2014; WHO, 2018; WHO, 2019).

Sabe-se que os consumidores não levam em conta apenas suas necessidades nutricionais e de saúde quando o assunto é a escolha de alimentos com apelo de saudabilidade, e sim, em grande parte das vezes, seus anseios pessoais é que mais impactam a escolhas de alimentos (STEINHAUSER et al., 2019; PINTO et al., 2021). Compreender estes fatores, subjacentes à escolha alimentar humana, e como eles se relacionam às preferências individuais, é essencial para a formulação de produtos não somente mais saudáveis, mas que garantam o bem estar do consumidor e que facilitem a adoção de hábitos mais saudáveis e sustentáveis (JOMORI et al., 2008; RENNER et al., 2012).

O comportamento do consumidor, bem como suas escolhas alimentares, evoluem ao longo do tempo, de acordo com o contexto econômico, sociocultural e tecnológico (IKEDA et al., 2004; DOMICIANO et al., 2018).

Devido à sua contribuição para a qualidade de vida, o bem-estar do consumidor tem chamado a atenção e o interesse de pesquisadores das áreas de comportamento do consumidor, economia e psicologia (MANCHANDA, 2017).

Segundo Manchada (2017) o bem-estar não inclui apenas o crescimento financeiro ou a inexistência de doenças, mas também elementos essenciais da satisfação geral com a vida, como felicidade, boa forma e saúde (MANCHANDA, 2017).

A este respeito, sabe-se que a dieta e a alimentação tem forte impacto sobre a saúde, qualidade de vida e bem-estar do consumidor (DEFRANCESCO, et al., 2016; STOK, et al., 2018). Esta constatação tem impulsionado o aumento da procura por alimentos que auxiliam na melhoria da qualidade de vida e na redução dos riscos de doenças crônicas (NIELSEN, 2016).

Observa-se que os consumidores que buscam melhorar a qualidade de vida estão cada vez mais conscientes sobre suas escolhas alimentares e das implicações dessas escolhas sobre a saúde ( SCARPATO et al., 2017; PINDUS; HAFFORD, 2019). Nesse contexto é crescente a busca por alimentos relacionados com a melhoria da qualidade de vida e com a redução dos riscos de doenças crônicas, além do aumento da procura por informações relacionadas à nutrição, às dietas e ao valor nutritivo dos alimentos (GHVANIDZ et al., 2017; CAPUTO, et al., 2018).

Observa-se também, que devido ao estilo de vida moderno, o consumo mundial de alimentos industrializados ainda é elevado (MONTEIRO, et al., 2018). Dessa forma, além de alimentos mais saudáveis, os consumidores demandam por opções de alimentos prontos para o consumo ou de fácil preparo, que permitam economia de tempo e de esforços (SCHLINKERT et al., 2020).

Apesar destas tendências gerais de consumo estarem bem elucidadas, sabe-se que a escolha alimentar humana é um mecanismo de alta complexidade e de difícil compreensão, e que está relacionada com diversos outros fatores como os anseios pessoais, crenças, aspectos culturais, renda, escolaridade, gênero, presença de filhos, status e hábitos de saúde, conhecimento nutricional, entre outros (KIM; NAYGA; CAPPS, 2001; MCLEAN-MEYINSSE, 2001; LOUREIRO, GRACIA; NAYGA, 2006; DRICHOUTIS et al., 2008; WILLIAMS; MUMMERY, 2013; MILLER; CASSADY, 2015; LASSEN et al., 2016; STEINHAUSER et al., 2019; JÁUREGUI et a., 2020).

Dessa forma, para que as indústrias alimentícias consigam desenvolver e ofertar no mercado produtos alimentícios mais saudáveis e que atendam as necessidades e desejos dos consumidores, é necessário que as mesmas levem em consideração esses aspectos e como eles se relacionam às preferências e necessidades de cada tipo de consumidor, já que as percepções que cada indivíduo tem sobre “alimentação saudável” são subjetivas e inerentes a diversos fatores (PAQUETTE, 2005; CARELS et al., 2007; PINTO et al., 2021).

## **2.4. Motivadores da escolha alimentar**

Apesar das diversas tentativas em elucidar o comportamento do consumidor, sabe-se que o processo de escolha alimentar está conectado a uma ampla gama de diferentes fatores (STEINHAUSER et al., 2019; PINTO et al., 2021).

A este respeito, os modelos de escolha alimentar demonstram que os indivíduos realizam suas escolhas alimentares baseando-se principalmente em fatores que lhes são pessoalmente mais importantes (JOMORI et al., 2008; RENNER et al., 2012; SOBAL E BISOGNAL, 2009).

Esses fatores, que geralmente são correlatos, podem ser divididos em dois tipos: àqueles inerentes ao indivíduo, como fatores biológicos, fisiológicos, de saúde, sócio-culturais, educacionais, psicológicos, etc., e aqueles inerentes ao próprio alimento, como sabor, textura, aparência, preço, embalagem, informações contidas no rótulo, etc.. (JOMORI et al., 2008).

### **2.4.1 Fatores motivacionais Inerentes ao Indivíduo**

Quando se tratam de motivadores da escolha alimentar, inerentes ao indivíduo, variáveis relacionadas com motivação para saúde, qualidade de vida e bem-estar, estão, de maneira geral, entre as mais importantes em estudos sobre o comportamento do consumidor orientado para a saúde e o bem-estar (MILLER; CASSADY, 2015;



BIALKOVA et al., 2016; STEINHAUSER et al., 2019). Estas variáveis têm grande impacto na percepção de saudabilidade dos alimentos, bem como no processo de escolha alimentar (FENKO et al., 2016; HUNG et al., 2017; ASIOLI et al., 2017; ANNUNZIATA; MARIANI, 2019).

Dentre essas variáveis podemos citar, por exemplo, àquelas relacionadas com a busca por longevidade e prevenção de doenças, tratamento ou controle de comorbidades pré existentes, presença de restrições ou necessidades dietéticas específicas e satisfação em relação ao próprio peso ou imagem corporal (YU-HUA, 2008; ARES; GÁMBARO, 2008; SOBAL E BISOGNI, 2009; BUCHER et al., 2016; GHVANIDZE, et al., 2017; GOVINDARAJU, SAHLE E MCCAFFREY, 2018; SCHULZE et al., 2018; GOVINDARAJU, CAPRARA, 2018; D'ANGELO et al., 2020; ROUNSEFELL et al., 2020; MONTERROSA, et al., 2020; PINTO et al., 2021; GARGANO, et al., 2021; ENRIQUEZ; ARCHILA-GODINEZ, 2021).

Sabe-se que os consumidores orientados para a saúde e para o bem estar ainda são, em sua maioria, mulheres, para as quais variáveis como a autopercepção da imagem e peso corporal tem forte influência no comportamento alimentar (CARRAÇA et al., 2011; KNUDSEN et al., 2014; STEINHAUSER et al., 2019; ROUNSEFELL et al., 2020; GAYLIS et al., 2020; DIAS et al., 2021; NISWAH et al., 2021; PINTO et al., 2021, MONTEIRO et al., 2021). Estes fatores são portanto, importantes em estudos sobre o comportamento alimentar de indivíduos orientados à saúde e ao bem estar, bem como em ações para promoção de uma alimentação mais saudável (CARRAÇA et al., 2011; ROUNSEFELL et al., 2020; GAYLIS et al., 2020; DIAS et al., 2021; NISWAH et al., 2021; PINTO et al., 2021).

Vários estudos ressaltam que culturalmente as mulheres estão mais preocupadas com a saúde em geral, bem como com a forma física e o peso corporal, o que se reflete nas escolhas alimentares com maior aderência a padrões alimentares saudáveis, quando comparadas com os homens (BEARDSWORTH et al., 2002; MALINAUSKAS et al., 2006; KNUDSEN et al., 2014; DEL MAR BIBILONI et al., 2017; BECK et al., 2018; QUITTKAT et al., 2019; MONTEIRO et al., 2021).

Por fim, estudos apontam, também, que quanto maior a renda, escolaridade e conhecimento nutricional maior é o interesse por uma alimentação saudável, bem como por informações dos rótulos dos alimentos (KIM; NAYGA; CAPPAS, 2001; MCLEAN-MEYINSSE, 2001; LOUREIRO, GRACIA AND NAYGA, 2006; DRICHOUTIS et al., 2008; WILLIAMS; MUMMERY, 2013; MILLER; CASSADY, 2015; LASSEN et al., 2016; STEINHAUSER et al., 2019; JÁUREGUI et a., 2020). Portanto tais fatores também merecem ser considerados em estudos sobre o comportamento e escolha alimentar de indivíduos com orientação para saúde e bem-estar.

#### **2.4.2 Fatores motivacionais inerentes ao alimento: informações do rótulo**

Quando nos referimos a fatores que motivam as escolhas alimentares e que são inerentes ao alimento, alguns dos mais importantes para os consumidores em geral, como o sabor e textura, não podem ser avaliados no momento da compra de alimentos embalados (FRASER, 2018). Portanto, para alimentos embalados, fatores como o *design* e as informações contidas no rótulo estão entre os mais importantes na decisão de compra (FRASER, 2018; MARTINI; MENOZZI, 2021).

É por meio do rótulo que fabricantes informam aos consumidores os principais atributos do produto (SHANGGUAN et al., 2019; MARTINI; MENOZZI, 2021). Sendo assim, o rótulo constitui importante ferramenta de marketing e comunicação, sendo suas informações cruciais no processo de escolha e compra (STEINHAUSER et al., 2019; JÁUREGUI et a., 2020; MARTINI; MENOZZI, 2021).

Como as informações do rótulo exercem grande impacto sobre o processo de escolha e compra de alimentos, a utilização destas informações devem estar bem amparadas pelas normas vigentes (ANVISA 2019ab).

No Brasil, a Agência Nacional de Vigilância Sanitária (ANVISA) é o órgão responsável pela normatização da rotulagem de alimentos embalados. Entre as principais normas em vigor sobre a rotulagem de alimentos embalados, destaca-se a RDC nº 259 de 2002 (BRASIL, 2002). Segundo esta resolução, o rótulo constitui o

principal elemento identificador do produto. Nele se apresenta toda inscrição, seja ela legenda, imagem, matéria descritiva ou gráfica, que esteja escrita, impressa, estampada, gravada, gravada em relevo, litografada ou colada sobre a embalagem do alimento (BRASIL, 2002).

Quando se trata da escolha de alimentos saudáveis, são as informações contidas na tabela de informação nutricional, na lista de ingredientes e/ou nas alegações da parte frontal do rótulo as mais importantes no processo de escolha e compra (ANVISAab, 2019; WHO, 2019).

Para consumidores que buscam uma alimentação mais saudável, são as informações do rótulo sobre ingredientes, teor de nutrientes e presença de alergênicos as mais importantes no momento da escolha de um produto (STEINHAUSER et al., 2019; MARTINI; MENOZZI, 2021). Portanto, estudos que investiguem o impacto dessas informações, sobre o comportamento desses consumidores, são necessários (MILLER, S. L. M.; CASSADY, 2015; CECCHINI et al., 2016; FRASER, 2018; FRASER, 2018; SHANGGUAN et al., 2019; STEINHAUSER et al., 2019; STEINHAUSER et al., 2019; DE MORAIS SATO et al., 2019; OOSTENBACH et al., 2019; JÁUREGUI et al., 2020; MARTINI; MENOZZI, 2021).

#### **2.4.2.1 Ingredientes**

Segundo a RDC 259, principal regulamento em vigor sobre rotulagem de alimentos embalados, os ingredientes são todas as substâncias, incluídos os aditivos alimentares, empregadas na fabricação ou no preparo de alimentos, e que estão presentes no produto final em sua forma original ou modificada (BRASIL, 2002). As informações do rótulo sobre ingredientes são especialmente importantes para todos aqueles que buscam uma alimentação mais saudável (STEINHAUSER et al., 2019; MARTINI; MENOZZI, 2021).

As informações sobre os ingredientes do produto podem ser obtidas pelo consumidor de duas formas no rótulo: por meio da lista de ingredientes, que é

obrigatória, ou por meio de alegações expostas na parte frontal do rótulo (BRASIL, 2002; ANVISA, 2016).

Apesar da lista de ingredientes ser um instrumento de informação útil, sabe-se que inscrições na parte frontal do rótulo possuem maior influência sobre a decisão de compra (ANVISAab, 2019; WHO, 2019). A este respeito, inscrições na parte frontal dos rótulos sobre a presença de ingredientes, como por exemplo, “Feito Com...”, “Adoçado com...”, etc., são permitidas por lei, desde que atendam as normativas vigentes (BRASIL, 2002; ANVISA 2016).

Consumidores que se preocupam com sua alimentação têm procurado cada vez mais por alimentos elaborados com ingredientes naturais, orgânicos e ricos em fibras e/ou proteínas (SETHI et al., 2016; JONATHAN et al., 2017; EUROMONITOR, 2018; SCHNETTLER et al., 2019; ITAL, 2020). Ao passo que ingredientes como gorduras, açúcares e sódio são frequentemente evitados (RIZK; TREAT, 2014; LUSK, 2019a).

Observa-se, também, maior procura por alimentos e/ou ingredientes com fins de funcionalidade, já que estes, comprovadamente, fornecem aos consumidores benefícios que vão além da nutrição básica (KÜSTER-BOLUDA; VIDAL-CAPILLA, 2017; STATISTA; 2020). Os alimentos ou ingredientes funcionais, mais especificamente, são aqueles capazes de proporcionar benefícios fisiológicos demonstrados e/ou de reduzir o risco de doenças crônicas (IFIC, 1998; HEALTH CANADA, 1998).

Segundo a Associação Brasileira de Alimentos Funcionais, alimentos como alguns peixes (sardinha, salmão, etc., ), óleos vegetais (nozes, amêndoas, castanhas, oliva), frutas (cerejas, amoras, uvas, goiabas, melancias, tomates, frutas cítricas, etc), vinhos tinto, leguminosas (feijões, ervilhas, soja, etc) e aveia são alguns exemplos de alimentos/ingredientes que possuem propriedades funcionais comprovadas (SBAF, 2020).

Nota-se também, uma crescente procura por alimentos e/ou ingredientes proteicos (STATISTA, 2018; KÅRLUND et al., 2019). De acordo com Kårlund et al. (2019), os suplementos, alimentos e/ou ingredientes proteicos são amplamente

demandados por consumidores que buscam uma dieta equilibrada e que são habitualmente ativos fisicamente. Estes consumidores geralmente procuram por produtos que os auxiliam no ganho/manutenção de massa muscular ou na perda/controla de peso (STATISTA, 2018).

As percepções dos consumidores em relação à naturalidade dos produtos têm se tornado cada vez mais importantes para a aceitação e consumo de alimentos com apelo à saúde (ROMÁN et al., 2017; MIGLIORE et al., 2018). Apesar das percepções sobre "alimentos saudáveis" serem individuais e subjectivas, para a maioria dos consumidores, a naturalidade dos alimentos é um dos fatores apontados como cruciais no momento da escolha (ROMÁN et al., 2017; LUSK 2019ab; MONTERROSA et al., 2020; PINTO et al., 2021). Para alimentos o termo "natural" ainda não é bem definido, no entanto, estudos demonstram que a presença ou ausência de aditivos alimentares são um dos aspectos mais importantes na percepção de naturalidade do produto (ASIOLI et al. 2017, LUSK 2019b; PINTO et al., 2021).

Em estudos anteriores, foi demonstrado que alegações sobre a naturalidade do produto nos rótulos de alimentos influenciam positivamente a escolha e intenção de compra do consumidor (ASIOLI et al. 2017, LUSK 2019b). Para os consumidores, os alimentos com alegações de ingredientes naturais devem estar isentos de aditivos artificiais (EUROMONITOR INTERNATIONAL, 2016; ROMÁN et al., 2017; LUSK, 2019b).

A indústria alimentar tem respondido a estas tendências com a utilização de "rótulos limpos", que enfatiza principalmente uma lista pequena de ingredientes e a ausência de aditivos ou ingredientes desnecessários (ROMÁN, et al., 2017; ASIOLI et al., 2017). Os rótulos "*clean label*", numa abordagem mais detalhada, podem remeter-se a produtos "naturais", "orgânicos" e/ou "isentos de aditivos/conservantes" (ASIOLI et al., 2017).

A procura por alimentos e ingredientes naturais e orgânicos têm crescido constantemente nas últimas décadas, sendo ambos frequentemente referidos de forma quase intercambiável ou apresentados em conjunto como um segmento de mercado

(GIFFORD; BERNARD 2011; LUSK, 2019a). A este respeito sabe-se que uma maior preocupação com as condições de saúde e um estilo de vida saudável são fatores que tem impulsionado cada vez mais a atitude positiva dos consumidores em relação a estes tipos de alimentos (CHEN, 2007; D'AMICO et al., 2016; MARTINS et al., 2019).

Ao mesmo tempo em que os consumidores se tornam cada vez mais interessados na naturalidade dos alimentos, eles também têm buscado cada vez mais reduzir o consumo de açúcares (SARAIVA et al., 2020). Essas duas tendências, associadas, têm refletido num aumento da procura e da utilização de edulcorantes naturais que possam substituir o açúcar (CAROCHO et al., 2017; MOORADIAN et al., 2017; SARAIVA et al., 2020). Os edulcorantes são substâncias capazes de conferir gosto doce ao alimento sem elevar significativamente o valor calórico do mesmo (NABORS, 2002; CAROCHO et al., 2017).

Por fim, os ingredientes impactam diretamente no perfil/qualidade nutricional dos alimentos, o que se refletirá automaticamente nas informações nutricionais exibidas no rótulo. Dessa forma, compreender como os consumidores se relacionam com estas informações, também é de suma importância.

#### **2.4.2.2 Informações nutricionais**

As informações nutricionais do produto tem forte impacto sobre a escolha alimentar de consumidores que buscam uma alimentação saudável (CAVALIERE; RICCI; BANTERLE, 2015; HUNG et al., 2017; STEINHAUSER et al., 2019; HUANG et al., 2019; JÁUREGUI et a., 2020).

Estudos apontam, por exemplo, que quanto maior a motivação para a saúde (; CAVALIERE et al., 2015; HUNG et al., 2017; STEINHAUSER et al., 2019; HUANG et al., 2019) e a conscientização sobre dieta, saúde e nutrição (STEINHAUSER et al., 2019; JÁUREGUI et al., 2020), maior é o interesse e a atenção dada às informações nutricionais dos rótulos dos alimentos.

No Brasil, a Agência Nacional de Vigilância Sanitária (ANVISA) é o órgão responsável pela normatização da rotulagem de alimentos e pelos principais regulamentos técnicos e leis em vigor sobre rotulagem nutricional de alimentos, que são: RDC's nº 359 e RDC nº 360 de 2003 (sobre rotulagem nutricional obrigatória), RDC nº 54 de 2012 (sobre informações nutricionais complementares), RDC's nº 135/2017 e nº 136/2017 (sobre alegações de lactose), e a lei 10.674/2003 (sobre declarações de glúten) (BRASIL, 2002; BRASIL, 2003abc; BRASIL 2012; BRASIL, 2017ab).

### **a) Informações nutricionais obrigatórias**

De acordo com o principal regulamento técnico brasileiro em vigor sobre informações nutricionais, a RDC nº 360 de dezembro de 2003, a tabela de informação nutricional, presente na parte traseira dos rótulos, constitui o principal elemento oficial e obrigatório de informação nutricional dos alimentos e bebidas embalados (BRASIL, 2003).

Na tabela nutricional, além da declaração obrigatória do valor energético e de carboidratos, proteínas, gorduras totais, gorduras saturadas, gorduras trans, fibra alimentar e sódio, outros nutrientes, como vitaminas e minerais e colesterol, também podem ser declarados (BRASIL, 2003).

Apesar da tabela de informação nutricional ser amplamente regulamentada por órgão competente e ser empregada com o objetivo de auxiliar os consumidores na escolha e na compra de alimentos mais saudáveis, sabe-se que isto não garante que os consumidores compreendam adequadamente estas informações e que estejam utilizando-as para a escolha de alimentos que sejam realmente mais saudáveis (ANVISA, 2019ab).

Pesquisa realizada em 2016 pelo Instituto Brasileiro de Defesa do Consumidor (IDEC) com 2.651 indivíduos, identificou que 40% dos entrevistados têm dificuldade de entender o conteúdo da tabela nutricional e 39,6% disseram compreender parcialmente

ou muito pouco a rotulagem nutricional atual. Entre os fatores apontados que dificultam o entendimento estão o tamanho da letra (61%), o uso de termos técnicos (51%) e a poluição visual do rótulo (41,6%) (IDEC, 2020).

Segundo a ANVISA a compreensão das informações da tabela nutricional exige conhecimento e tempo, além disso os consumidores geralmente têm dificuldade de leitura e compreensão das informações (ANVISA, 2018; ANVISA, 2019ab).

Segundo o IDEC, o hábito de ler alegações nutricionais é mais difundido entre os consumidores, já a tabela nutricional é bem menos consultada e, embora aparentemente compreendida por boa parte dos consumidores (o que reforça a ideia de mantê-la), não parece muito utilizada no dia a dia por várias razões, entre as quais, a dificuldade de leitura (ANVISA, 2019ab; IDEC, 2020).

Diferentemente das informações contidas na tabela nutricional, as alegações nutricionais, apresentadas na parte frontal dos rótulos, são mais simples e diretas, e atuam como facilitadores do processo de compra, uma vez que expõe atributos importantes do produto diretamente na parte frontal da embalagem e de forma mais perceptível (BALLCO, et al., 2019; STEINHAUSER et al., 2019; ANVISA, 2019ab; ANVISA, 2021a).

## **b) Informações nutricionais complementares**

De acordo com o principal regulamento técnico brasileiro em vigor sobre informações nutricionais complementares (RDC nº 54 de novembro de 2012), às frases ou alegações de nutrição, expostas na parte frontal dos rótulos, são consideradas os principais elementos da rotulagem nutricional não obrigatória de alimentos embalados (BRASIL, 2012).

Segundo esta normativa as informações nutricionais complementares (INC), expressas em forma de frases/alegações nas partes frontais do rótulo, são utilizadas de forma opcional pelos fabricantes e se referem aos teores de açúcares, gorduras totais,



gorduras saturadas, ômega 3, 6 e 9, colesterol, sódio, sal, vitaminas, minerais, proteínas, fibras e valor energético dos alimentos embalados (BRASIL, 2012)..

As alegações nutricionais na parte frontal dos rótulos são importantes motivadores da escolha alimentar, pois permitem ao consumidor identificar com mais facilidade as características nutricionais de interesse (ANVISAab, 2019; BALLCO, et al., 2019).

Quando se trata do comportamento dos consumidores motivados para a saúde e o bem-estar, ou seja, que buscam viver e comer de forma saudável, sabe-se que estas informações em geral são de grande interesse e impactam diretamente o processo de escolha de alimentos (CAVALIERE et al., 2015; ANNUNZIATA; MARIANI, 2019; STENHAUSER, et al., 2019).

Estas informações tendem a ser mais simples e diretas, atuando como facilitadores do processo de compra, uma vez que para alimentos com apelo de saudabilidade, o consumidor deseja ver os atributos do produto diretamente na embalagem e de forma perceptível (BALLCO, et al., 2019; STEINHAUSER et al., 2019; JÁUREGUI et al., 2020).

As alegações nutricionais podem auxiliar os consumidores a fazerem escolhas alimentares mais conscientes (ANNUNZIATA; MARIANI, 2019; STEINHAUSER et al., 2019; JÁUREGUI et al., 2020; WHO, 2018, 2019, 2020). No entanto, quando mal empregadas e/ou utilizadas, as alegações têm o potencial de direcionar erradamente o consumidor (BIALKOVA, et al., 2016; ANVISA, 2019a).

Apesar dessas informações serem úteis para a identificação de propriedades nutricionais positivas do alimento, cabe ressaltar que sozinhas não revelam todas as características do produto, ou seja, caracterizar um alimento como mais saudável apenas por meio das alegações contidas na parte frontal do rótulo pode induzir o consumidor ao erro (ANVISA, 2019ab).

As alegações só podem facilitar a identificação e a escolha de alimentos nutricionalmente mais saudáveis e/ou adequados às necessidades individuais de cada consumidor se utilizadas da forma correta, em conjunto com as demais informações

nutricionais do alimento, que até então, são ainda apresentadas somente na tabela nutricional (ANVISA, 2019ab; ANVISA, 2021b).

Sabe-se no entanto que os consumidores geralmente não se atentam às informações da tabela nutricional, dando preferência às informações da parte frontal do rótulo (ANVISA, 2019a; BALLCO, et al., 2019; STEINHAUSER et al., 2019; WHO, 2018, 2019, 2020; JÁUREGUI et al., 2020; ANVISA, 2021ab;). Dessa forma, com o objetivo de facilitar a compreensão das informações nutricionais e evitar interpretações equivocadas em relação às alegações nutricionais, em 9 de outubro 2020 a ANVISA publicou a RDC N° 429, uma nova regulamentação sobre a rotulagem nutricional dos alimentos embalados, que entrará em vigor 24 meses após sua data de publicação. (ANVISA, 2018; ANVISA, 2020; BRASIL, 2020b).

Dentre as diversas mudanças propostas, está a adoção de um modelo de rotulagem nutricional frontal, em formato de lupa, que tem por objetivo fornecer informações simplificadas e padronizadas no painel principal do rótulo do alimento, de fácil identificação e compreensão pelo consumidor, que indicará se o alimento possui altas concentrações de açúcares adicionados, gorduras saturadas ou sódio (ANVISA, 2019ab; ANVISA, 2021b).

Este sistema de rotulagem tem sido amplamente discutido e recomendado devido a sua capacidade de advertir ao consumidor, de forma clara e objetiva, sobre a presença de excesso de nutrientes prejudiciais à saúde (ANVISA, 2019a; ANVISA, 2020; WHO, 2019, 2020; ANVISA, 2021b). Modelos semelhantes de rotulagem nutricional frontal vem sendo adotados por diversos países a fim de promover escolhas mais conscientes (Ministry of Health of Israel, 2017; Ministry of Public Health of Uruguay, 2018, Ministry of Health of Peru, 2018; ANVISA, 2020; OHCHR, 2020; MAYO, 2020).

As novas diretrizes propostas também proíbem o uso de alegações nutricionais, referentes aos nutrientes de advertência, para alimentos que possuem alto teor de gordura, sódio ou açúcares adicionados, ou seja, para alimentos com alto teor de açúcares adicionados, por exemplo, não será possível destacar no rótulo “light” ou

“reduzido em açúcares” (ANVISA, 2021b). Estas mudanças de rotulagem visam impedir que o consumidor, por engano, opte por produtos que possuam essas mensagens, mesmo quando estas mascaram o verdadeiro perfil nutricional do alimento (ANVISA, 2019ab).

O painel de informações nutricionais frontal e as alegações frontais, apesar de antagônicos, tendem a se reforçar mutuamente, aumentando a credibilidade e utilidade de ambas as informações no que tange a busca por alimentos mais saudáveis (CODEX, 2017; WHO, 2019; OHCHR, 2020). Dessa forma, é possível que a partir da disseminação dos rótulos nutricionais frontais, as alegações nutricionais passem a ter ainda mais valor informativo para o consumidor, podendo vir a serem utilizadas com mais frequência e segurança na identificação e escolha de produtos mais saudáveis (WHO, 2019).

Quando nos referimos ao comportamento do consumidor frente às diversas alegações nutricionais, estudos sugerem que diferentes grupos de consumidores podem reagir de maneiras diferentes frente a estas informações (ANNUNZIATA; VECCHIO, 2013; HIEKE et al., 2015; KAUR et al., 2017; STEINHAUSER et al., 2019).

Além disso o grau de familiaridade, bem como credibilidade das alegações irá variar de acordo com a alegação considerada, confirmando que as respostas dos consumidores às alegações frontais são também estritamente conectadas à cada tipo de reivindicação e a cada tipo de consumidor (CAVALIERE et al., 2015; ANNUNZIATA; MARIANI 2019; HUANG et al., 2022). Dessa forma, mais estudos que considerem o efeito de cada uma dessas informações sobre os diferentes perfis de consumidores são necessários.

De maneira geral, sabe-se que consumidores orientados a saúde e ao bem estar, tendem a ter maior preferência ou interesse geral por alegações, bem como maior intenção de compra por produtos com estas informações (VAN WEZEMAEL et al., 2014; BIALKOVA et al., 2016; BALLCO et al., 2019; LÓPEZ-GALÁN; DE-MAGISTRIS, 2019; STEINHAUSER et al., 2019; ANNUNZIATA; MARIANI 2019; HUANG et al., 2022).

A este respeito sabe-se também que em geral as mulheres estão entre as mais interessadas, e têm maior preferência ou maior intenção de compra por produtos rotulados com alegações (STEINHAUSER; HAMM, 2018; ANNUNZIATA; MARIANI, 2019). Este interesse tende a ser maior à medida que se eleva o nível de escolaridade (CAVALIERE et al., 2015; VECCHIO et al., 2016; JURADO; GRACIA, 2017; ANNUNZIATA; MARIANI, 2019;) e de conhecimentos em nutrição (CAVALIERE et al., 2015).

Geralmente alegações associadas com a redução ou ausência de gorduras (ØVRUM et al., 2012; KRYSTALLIS; CHRYSOCHOU, 2012; VAN WEZEMAEL et al., 2014; JURADO; GRACIA, 2017) e açúcares (CAVALIERE et al., 2015; BALLCO et al., 2019) estão entre as mais importantes para os consumidores que buscam uma alimentação mais saudável. A importância dada a estas alegações pode ser devido ao fato de que a diminuição do consumo de gorduras, particularmente gorduras saturadas, e de açúcares, pode reduzir o risco de doenças crônicas (LÄHTEENMÄKI, 2013; WHO, 2018; 2019).

Por fim, investigações sugerem que a presença de patologias pessoais, incluindo restrições alimentares como aquelas ligadas ao glúten e/ou lactose, afeta positivamente a utilização, interesse e motivação geral em relação às alegações nutricionais (LÄHTEENMÄKI, 2013; JURADO; GRACIA, 2017; HUNG et al., 2017).

### **c) Alegações de lactose e glúten**

Apesar dos alimentos sem lactose e/ou glúten serem destinados a atender um grupo específico de indivíduos, que possuem intolerância/alergia a estes nutrientes, sabe-se que cada vez mais pessoas, preocupadas com saúde e alimentação, optam por seguir dietas que restringem o consumo desses nutrientes (WILLEMS, 2020; ALKALAY, 2021).

Estudo com grupos focais revelou, por exemplo, maior preferência dos consumidores por modelos de rotulagem frontal que indicassem, por meio de símbolos

ou alertas, a presença de determinados constituintes, como glúten e lactose, considerando-os mais úteis para realizar escolhas alimentares informadas (OLIVEIRA et al., 2016).

Além disso, os índices de casos de pessoas que apresentam alergia ao glúten e também intolerância à lactose aumentaram nos últimos anos, provocando maior busca por alimentos isentos desses nutrientes (CHEVALIER et al., 2018). Estima-se que 65% da população mundial é afetada pela intolerância à lactose (BAYLESS, et al., 2017), enquanto que os distúrbios relacionados ao glúten têm emergido gradualmente como um fenômeno epidemiologicamente relevante (BOARIM, 2018; ALKALAY, 2021).

Pessoas que possuem doença celíaca ou sensibilidade ao glúten e/ou com intolerância à lactose necessitam ter uma alimentação com restrição de tais nutrientes (ALKALAY, 2021). Dessa forma, alegações sobre o conteúdo desses nutrientes tendem a ser especialmente importantes para esses indivíduos no momento da escolha alimentar. Além disso, quanto maior a preocupação com a saúde e a alimentação saudável, maior a atenção dada a estas informações (LÄHTEENMÄKI, 2013; JURADO; GRACIA, 2017; HUNG et al., 2017).

Conforme as RDC's nº 135/2017 e 136/2017, a utilização de alegações sobre o conteúdo de lactose nos rótulos dos alimentos embalados não é facultativa, sendo opcional para alguns alimentos para fins especiais (como aqueles para dietas com restrição de lactose) e obrigatória para alimentos, incluindo bebidas, ingredientes, aditivos alimentares e coadjuvantes de tecnologia, que contenham lactose em quantidade maior do que 100 (cem) miligramas por 100 (cem) gramas ou mililitros do alimento tal como exposto à venda. Estas normativas exigem que as informações sobre o conteúdo de lactose se dêem de acordo com três tipos de rotulagem: "zero lactose", "baixa lactose" e 'contém lactose' (BRASIL, 2017ab).

Com relação ao glúten, como medida preventiva e de controle da doença celíaca, segundo a Lei 10.674/2003, todos os alimentos devem apresentar nos seus rótulos as inscrições "contém glúten" ou "não contém glúten", conforme o caso (BRASIL, 2003a).

A padronização da utilização dessas informações nos rótulos têm por objetivo garantir informações de qualidade ao consumidor, a fim de evitar falsas declarações como estratégia de marketing (WILLEMS, 2020).

Por fim, é importante, porém, mencionar que não existem evidências suficientes que comprovem que pessoas saudáveis se beneficiem de uma dieta sem lactose (ROMERO-VELARDE, et al., 2019). Por outro lado, os estudos mais recentes têm relacionado o consumo de glúten com o aumento de níveis séricos de zonulina (proteína que regula o revestimento e a permeabilidade intestinal) (PARAY, et al., 2020; FASANO, 2020). Sabe-se que uma maior ativação da via da zonulina está relacionado com uma maior permeabilidade intestinal (*leaky gut*), que por sua vez colabora com o surgimento de doenças inflamatórias e autoimunes, como diabetes tipo 1, esclerose múltipla, doença inflamatória intestinal, obesidade, tireoidite de hashimoto, psoríase, etc (EL ASMAR et al., 2002; DRAGO et al., 2006; FASANO, 2011; BARBARO, et al., 2020; MU et al., 2016; OHLSSON et al., 2017; MÖRKL et al., 2018; PARAY, et al., 2020; FASANO, 2020; CAMARA-LEMARROY et al., 2019; CAYRES et al., 2021).

### 3. CONCLUSÃO

O mercado de alimentos saudáveis está em expansão e o setor de doces e sobremesas é um dos que se destaca. As exigências desse mercado requerem que fabricantes reformulem e/ou desenvolvam produtos que estejam cada vez mais alinhados com as recomendações das agências mundiais de saúde e que atendam às diferentes demandas dos consumidores orientados para a saúde e bem-estar.

No desenvolvimento destes produtos, fabricantes devem levar em consideração as preferências e necessidades de cada tipo de consumidor, já que as percepções sobre “alimentação saudável” e “escolhas alimentares saudáveis”, são subjetivas e inerentes a diversos fatores, incluindo interesses e motivações pessoais. Estudar estes fatores e como eles encorajam as atitudes alimentares saudáveis, é também muito importante para a promoção da saúde.

Quando se pretende estudar o comportamento do consumidor frente a alimentos saudáveis, variáveis que levem em conta as motivações desses indivíduos para a saúde, bem estar e qualidade de vida, bem como suas percepções e preferências em relação aos ingredientes e informações nutricionais dos rótulos desses produtos, são as mais importantes a serem consideradas.

Sabe-se que a motivação do indivíduo para saúde, qualidade de vida e bem-estar em geral, têm forte impacto na percepção sobre a saudabilidade de produtos alimentícios e seus ingredientes, bem como na forma como as informações ou alegações nutricionais do rótulo destes produtos são interpretadas. Dessa forma, todos esses fatores se relacionam e têm forte impacto sobre o processo de escolha e compra de alimentos saudáveis.

Entender melhor essas relações e como elas impactam no comportamento de escolha e compra alimentar é de extrema importância, pois permite que fabricantes desenvolvam produtos adequados às demandas do consumidor alvo e que os informem, de maneira eficaz, os benefícios e características desses produtos. Estes conhecimentos, quando bem aplicados, têm a capacidade de facilitar o processo de escolha alimentar, bem como de promover escolhas mais conscientes.

Neste contexto, a fim de auxiliar que fabricantes de doces e sobremesas com apelo a saudabilidade atendam às diferentes demandas dos consumidores com orientação para a saúde e para o bem-estar, estudos que identifiquem os diferentes perfis destes consumidores, bem como suas preferências e percepções em relação à alegações nutricionais e ingredientes são de extrema importância.



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**SEGUNDA PARTE- ARTIGOS**

**ARTIGO 1 - HEALTH AND WELLNESS-ORIENTED CONSUMER INTERESTS AND PREFERENCES REGARDING NUTRITION CLAIMS ON SWEETS AND DESSERTS**

Versão preliminar para submissão e envio à revista científica *Journal of Food Products Marketing*. O conselho editorial do periódico poderá sugerir alterações para adequá-lo ao seu próprio estilo.

**Health and wellness-oriented consumer interests and preferences towards nutrition claims  
of sweets and desserts**

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**Abstract**

The growing interest of part of the population in a healthier lifestyle has driven the increased supply and demand for foods with health appeal. Given this, in order to assist in the development of new healthier products that meet the different demands of the consumer market, the purpose of this study was to assess the preferences and interests of health and wellness-oriented consumers regarding nutrition claims of packaged sweets and desserts. The survey was conducted through an online questionnaire answered by 409 people and three consumer segments were identified based on their interests and preferences for nutrition claims and willingness to overpay for sweets and desserts with these claims on the label. Two of the segments accounted for 79% of all respondents (Clusters A and C) and those consumers were very interested in nutrition claims of sweets and desserts. Segment B, with lower levels of interest in claims, claimed to have less healthy eating habits, suggesting the influence of this factor on the interest level in claims. The preferences and interests of each group were discussed further throughout this study, however, most consumers, in all three groups, were motivated to overpay for sweets and desserts with preferred claims, being, for all groups, claims related to trans/saturated fat content and sugars were among the most interesting and preferred. Therefore, in order to meet the demands of health and wellness oriented consumers, as well as to provide healthier desserts and sweets in line with what is being advocated by the world's leading health organizations, we consider it relevant and attractive for manufacturers to exclude or reduce the sugar and trans/saturated fat content in these products.

Keywords: Consumer behavior, market research, buying process, buy intention, cluster analysis.

## 1. Introduction

The modern health and wellbeing-oriented consumer is becoming more aware and demanding when choosing food products, increasingly looking on labels for information related to nutrition and nutritional value of food (Martins, 2016; Schnettler et al., 2019; Jáuregui et al., 2020). In response to these changes in consumption patterns, companies in the food industry have been trying to develop more and more products with an emphasis on health (TECHNOMIC, 2019). In this segment, one of the sectors that has stood out is sweets and desserts (Weisberg, 2017; TECHNOMIC, 2019, Lindell, 2020; Friedberg, 2020).

For consumers who seek a healthier and more nutritious diet, it is known that the nutritional information contained on labels is a crucial decision factor (Lähteenmäki, 2013; Santeramo et al., 2018; Steinhauser, Janssen, & Hamm, 2019). Consumers use this type of information to make decisions and choose healthier foods (Jurado & Gracia, 2017; Fraser, 2018; Ballco, de-Magistris, & Caputo, 2019; Jáuregui et al., 2020 ).

In this regard, globally, three main formats of nutrition information are identified on labels: nutrition information panels, front-of-pack nutrition labeling (FOP), and nutrition and health claims (NHCs) (Annunziata & Mariani, 2019).

Recent research reveals that consumer demand for food products containing nutritional information as frontal label claims has increased (Cavaliere et al., 2015; Santeramo et al., 2018; Annunziata & Mariani, 2019). Currently, about 25 to 50% of products in supermarkets are labeled with frontal claims, with nutrition claims being the most recurrent (Pravst & Kušar, 2015; Hieke et al., 2016).

The nutrition claims can be defined as "any representation that states, suggests or implies that a food has a specific nutritional property, including, but not limited to, the energy value and the content of protein, fat, and carbohydrates, as well as the content of vitamins and minerals" (WHO, 2004). This information is simpler and more direct and acts as a facilitator of the choice and purchase process because for foods focused on health and well-being, the consumer can see the attributes of interest directly on the front of the package (Ballco, et al. 2019).

This information evokes the positive nutritional attributes of the product, thus, in conjunction with FOP's and nutrition information panels, are able to help consumers make healthier and more conscious food choices (CODEX, 2017; WHO, 2019; OHCHR, 2020). Therefore, studies aimed at understanding consumer behavior regarding nutrition claims are essential, as this information is extremely relevant at the time of purchase (Lähteenmäki, 2013; Santeramo et al., 2018; Steinhauser et al., 2019).

When it comes to consumer behavior vis-à-vis nutrition claims, studies suggest that different groups of consumers react differently to nutritional claims (Annunziata & Vecchio, 2013; Kaur, Scarborough, & Rayner, 2017; Steinhauser et al., 2019). There are several characteristics of consumers that can influence the effect of nutritional claims on their preferences and/or buying behavior, and should therefore be better studied (Bialkova, Sasse, & Fenko, 2016; López-galán & de-Magistris, 2019; Steinhauser et al., 2019; Annunziata & Mariani, 2019).

It is also widely accepted that women are among the most interested, and have a greater preference or greater purchase intention for products labeled with nutrition and health claims (Steinhauser & Hamm, 2018; Annunziata & Mariani, 2019). Furthermore, variables that take into account aspects related to the individual's 'nutritional knowledge' and the 'motivation for health' are among those that most deserve to be investigated in studies on consumer behavior since they are the ones that most impact how some food packaging information is processed (Lähteenmäki, 2013; Van Wezemael et al., 2014; Miller & Cassady, 2015; Sanja & Mirjana, 2015; Van Buul & Brouns, 2015; Fenko et al., 2016; Bialkova et al., 2016; Hung et al., 2017; Steinhauser & Hamm, 2018; Annunziata & Mariani, 2019).

Thus, in view of the above, this study aimed to evaluate the interests of consumers focused on health and well-being in relation to nutritional claims for sweets and desserts with an appeal to health. We also seek to trace and understand the main profiles of these consumers, as well as their desires, preferences and purchase motivations in relation to these products, thus generating information that helps manufacturers in the development of new products, not only healthier, but in line with the expectations of different types of consumers.

## **2. Methodology**

### *2.1 Survey Plan*

This is a descriptive research, with a cross-sectional design and quantitative approach (Malhotra, Nunan, & Birks, 2017). Online questionnaires, structured with closed questions, were applied in a non-probabilistic sample for convenience (Guerrero et al., 2010).

The content of the questionnaire was pre-tested with a pilot sample of 40 consumers before proceeding to the main survey. Both the pre-test and the main survey were conducted only after the approval of the project by the Ethics Committee for Research with Human Beings (COEP), under protocol CAAE (26806919.3.0000.5148), according to the National Health Council (Brazil, 2012).

The content of the questionnaire was based on what was proposed by Cavaliere, Ricci, & Banterle, 2015 and Annunziata & Mariani, 2019, and addressed variables related to the socio-economic and health conditions of the participants, their health motivations (quality of food choices and physical activity), nutritional knowledge, and labeling attention habits (Cavaliere et al., 2015; Annunziata & Mariani, 2019).

The main predictor questions of the questionnaire, addressing nutrition claims, were based on the terms established by the main legislations and guidelines related to the subject (FAO/WHO, 1997; WHO, 2004; European Parliamentarian, 2006). The nutrition claims employed may also be often found or declared on labels of sweets and desserts with health appeal (Weisberg, 2017; TECHNOMIC, 2019, Lindell, 2020; Friedberg, 2020).

In line with previous research on consumer profiles, consumer heterogeneity was considered through segmentation by characteristics using the Clusters methodology (Cavaliere, Ricci, & Banterle, 2015; Jurado & Gracia, 2017; Annunziata & Mariani, 2019; Ballco et al., 2019; Nobrega, Ares, & Deliza, 2020).



## *2.2 Content of the questionnaire*

The research was performed employing a structured questionnaire divided into 4 sections: (I) Criteria for framing the target population of the study, (II) preferences and perceptions of consumers by nutritional claims on the front of the labels of sweets and desserts, (III) health and nutrition aspects, and (IV) socioeconomic aspects.

To assess whether the respondent fitted or suited the target population of the research, they answered 4 questions in the session I related to: age, frequency of consumption in healthy grocery stores, frequency of consumption of sweets/desserts, and frequency of reading label information. Participants under 18 years old, who do not consume sweets/desserts, do not consume in health food stores, and do not read labels were excluded from the research.

The second and most important section of the questionnaire (II) had 13 predictive questions and aimed to assess the following aspects: (a) level of general and specific interest in relation to nutrition claims that may be made on the front labels of sweets and desserts, (b) preferred nutrition claims at the time of purchasing sweets or desserts, and (c) willingness to overpay for sweets or desserts with preferred nutritional claims.

The participants' level of interest in nutritional claims (a) was assessed by the degree of importance attributed to each of the eleven nutritional claims studied (Table 3). For each of the 11 questions, a 9-point Likert scale was used (1 = not important 9 = Extremely important). The preference for nutritional claims (b) was assessed using a 'checkbox' question where the participant had the option to choose, among the 11 claims presented, the 3 most preferred at the time of purchase (Table 4). The willingness to overpay for sweets or desserts with preferred nutritional claims at the time of purchase (c) was assessed employing of a multiple-choice question that aimed to assess, in percentage terms, how much the consumer would be willing to overpay for a sweet / dessert with the claims he stated were preferred (Table 5).

The third section of the questionnaire (III), containing 6 dichotomous questions, aimed to assess the following aspects of the consumer-related to health and nutrition: nutritional restrictions, lactose restrictions, gluten restrictions, the weekly physical activity practice, quality of food choices, or diet, and objective nutrition knowledge (Table 2).

The fourth section of the questionnaire (IV) had 5 questions addressing socioeconomic data related to gender, age, education, presence of children in the household, and family income (Tab. 1).

### *2.3 Sampling and data collection*

To meet the prerequisites of the research and to ensure that the recruited participants were potential health and wellness oriented consumers, a non-probabilistic sampling for convenience was carried out (Guerrero et al., 2010) followed by the use of specific exclusion criteria (session 1 of the questionnaire).

The online questionnaire was sent to 4,000 people, via private message on the social network Instagram, between the months of February and April 2020.

The questionnaire had a response rate of 13%, and of the 520 respondents, 409 (78.65%) met the established criteria regarding the target audience of the survey. The sample size was larger than necessary, taking into account an error level of about 5% (Kadam & Bhalerao, 2010).

### *2.4 Data analysis*

Data analysis included descriptive statistics (relative frequency), bivariate (chi-square test and unilateral analysis of variance), and multivariate analysis (cluster analysis). The reliability of the questions in the 9-point Likert scale questionnaire was determined by Cronbach's alpha coefficient ( $p < 0.06$ ), in which a coefficient greater than 0.700 represents acceptable internal consistency (Taber, 2018).

For identification and classification of consumer profiles, cluster analysis was applied considering Euclidean distances and Ward's aggregation method. The cluster analysis consisted of determining groups that are internally homogeneous, heterogeneous with each other, and mutually exclusive from the predictor variables a, b, and c of the second section of the questionnaire (II). The number of segments was determined based on the high pseudo-value F of Calinski-Harabasz and the observation of dendrograms.

Data on the level of interest in nutritional claims were subjected to the Kruskal-Wallis test ( $p < 0.06$ ), and comparisons between clusters were performed using the Scott-Knott test ( $p < 0.06$ ). The chi-square test was applied to verify the association between the formed clusters and the other variables studied. For significant associations ( $p < 0.06$ ), applied the post hoc analysis by the adjusted residuals (z-scores), tested against the p-value corrected by Bonferroni (Macdonald & Gardner, 2000). All statistical analyzes were performed using R language (R Core Development Team, 2019) and SPSS (Statistical Package for Social Sciences) software version 20.

### **3. Results**

#### *3.1 Characteristics of the participants - Socioeconomic, health and nutrition aspects*

Considering the convenience sampling and the research criteria, all participants were over 18 years old and claimed to consume products sold in health food stores, consume sweets and desserts, and read labels. The data on the frequency of reading the labels and nutritional information revealed that the target population of the study has a high level of attention to the labels, with 80.7% of the participants declaring that they always or frequently read the information on the labels and the nutritional information of the products they consume.

Regarding the socio-economic characteristics (Table 1), most participants were female (78.5%), aged between 25 and 39 years (48.9%), and without children (64%). Related to income and level of education, the values found are above national averages (IBGE, 2020), with 53% of respondents having a family income equal to or greater than 5 minimum wages and 78% having graduation as minimum education level.

**Table 1.** Socio-Economic characteristics of the participants (n = 409).

Socio-economic characteristics		Sample (n / %)	National Population (%)*
Gender	Female	321 / 78.5	52.6
	Male	88 / 21.5	47.4
Age	18 to 24	77 / 18.8	12.2
	25 to 39	200 / 48.9	27.4
	40 to 59	96 / 23.5	32.6
	60 or more	36 / 8.8	20.1
Education level	Primary School	0 / 0	50.5
	Secondary School	21 / 5.1	2.8
	Unfinished College Degree	69 / 16.9	5.5
	Complete college degree	118 / 28.9	15.2
	Post-graduate	201 / 49.1	n.a
Children	Yes	144 / 35.2	n.a
	No	265 / 64.8	n.a
Family income in minimum wages*	0 to 2	77 / 18.8	23.9
	2 to 5	113 / 27.6	49.1
	5 to 10	131 / 32.0	14
	10 to 25	62 / 15.2	10.3
	Above 25	26 / 6.4	2.7

\*Official data from the Brazilian Institute of Statistics and Geography on the socio-economic indicators of the Brazilian workforce (age > 14) (IBGE, 2020). \*\* The minimum wage in Brazil in 2020 was 1,045 BRL (US\$ 232.00) (Brazil, 2020)

Regarding the aspects related to health and nutrition, 21.8% of the respondents claimed to have some type of food restriction, among these, 11.5% claimed lactose intolerance and 2.9%

claimed some restriction associated with gluten. A total of 86.3% reported practicing physical activity at least once a week and 66% stated making mostly healthy food choices, in which at least 60% of the foods consumed daily are considered healthy by themselves. As for nutrition knowledge, 62.4% of the participants claimed to have some kind of objective knowledge in the area, acquired through academic studies or through health or nutrition professionals (Table 2).

**Table 2.** Nutrition, health, and label attention aspects of the participants (n = 409).

Variable		Sample (n)	%
Specific nutritional needs	Yes	89	28
	No	320	72
Lactose intolerance	Yes	47	11.5
	No	362	88.5
Gluten allergy, gluten sensitivity or celiac disease	Yes	12	2.9
	No	397	97.1
Physical activity	Active lifestyle*	353	86.3
	Sedentary lifestyle	56	13.7
Mostly Healthy food choices**	Yes	270	66.0
	No	139	34.0
Nutrition knowledge***	Yes	255	62.4
	No	154	37.6
Attention to Labels And Nutritional Information	Ever	209	51.1
	Always	121	29.6
	Sometimes	79	19.3

\*Physical activity one or more times a week. \*\*Mostly Healthy food choices - 60% or more of healthy daily food choices. \*\*\*knowledge from studies or professionals guidelines.

Considering all the characteristics of the research participants mentioned so far, regarding socioeconomic, health and nutrition aspects, it can be noted that the overall consumer profile of the research is in line with what was already expected for the target audience and also with what is described in several studies focusing on health and wellness-oriented consumers (Beardsworth et al, 2002; Malinauskas et al. 2006; Kempen et al., 2012; Miller & Cassady, 2015; dos Santos et al., 2021). The studies indicate that these consumers are even generally women, over 25 years old, who practice some physical activity, eat a healthy diet, are interested in nutritional information on food labels, and have higher education and purchasing power.

### *3.2. Consumer Segmentation - Perceptions and preferences on nutrition claims*

Three consumer segments were formed from the factors of section II of the questionnaire, related to the level of interest in nutritional claims on the labels of sweets and desserts (a), preference for claims at the time of buying sweets and desserts (b), and willingness to overpay for sweets and desserts with preferred nutritional claims (c). Cluster A was composed of 60.1% of the participants, cluster B by 21%, and cluster C by 18.8% (Table 3).

**Table 3.** Specific interest level in claims of sweets and desserts

<b>Importance Level in claims of sweets/desserts* (Cronbach's Alpha = 0.888)</b>	<b>Cluster A (n/% = 246/60.2)</b>	<b>Cluster B (n/% = 86/21.0)</b>	<b>Cluster C (n/% = 77/18.8)</b>	<b>p-value</b>
Low saturated fat / No trans fat	8.35 ± 1.02 Aa	5.55 ± 2.49 Ab	8.17 ± 1.08 Aa	<0.001
Rich / source / high vitamin content	7.98 ± 1.51 Ba	5.64 ± 2.48 Ab	7.91 ± 1.26 Aa	<0.001
Rich / Source / High Fiber	7.96 ± 1.45 Ba	5.48 ± 2.28 Ab	7.82 ± 1.38 Aa	<0.001
Rich / source / high protein content	7.89 ± 1.46 Ba	5.47 ± 2.55 Ab	7.86 ± 1.47 Aa	<0.001
Low fat	7.76 ± 1.47 Ba	4.62 ± 2.43 Bb	7.73 ± 1.29 Aa	<0.001
No-added-salt/ low-sodium	7.61 ± 1.76 Ca	4.69 ± 2.22 Bb	7.88 ± 1.29 Aa	<0.001
Diet/ Zero / No added/ No sugar	7.46 ± 1.95 Ca	4.42 ± 2.86 Bb	7.71 ± 1.55 Aa	<0.001
Rich / Source / High Mineral Content	7.33 ± 1.88 Ca	5.19 ± 2.63 Ab	7.43 ± 1.71 Ba	<0.001
Low energy / low calories / light	7.09 ± 1.93 Da	4.08 ± 2.61 Bb	7.23 ± 1.93 Ba	<0.001
No Gluten / Gluten-Free	5.00 ± 3.02 Eb	3.62 ± 2.63 Cc	7.34 ± 2.30 Ba	<0.001
Zero / No lactose/ lactose free	4.85 ± 3.04 Eb	3.66 ± 2.94 Cc	8.04 ± 1.58 Aa	<0.001
Average All Claims	7.21 ± 2.26 b	4.76 ± 2.65 c	7.74 ± 1.58 a	<0.001

\* Level of importance/interest of each claim according to a 9-point scale of importance, in which 1 = not important and 9 = Extremely Important. Letters followed by the same lower case letter in the row and uppercase in the column do not differ by the Scott-Knott test ( $p < 0.06$ ).

Considering the level of importance/interest for claims on the labels of sweets and desserts, Cluster C was the one with the highest level of interest for this kind of information, with an overall average equal to 7.74. In this group, all claims were considered very important, with average values above 7.23. The claims that stood out as the most interesting for this segment, and with no statistical difference between them, were those related to the content of total fats, saturated/trans fats, proteins, fibers, sugars, vitamins, sodium, and lactose.

Cluster A also attributed a high degree of general importance to the claims, with an overall average of 7.21. The claim related to the content of saturated fats was the most important

for this segment, with a score equal to 8.35, and the claims related to the content of gluten and lactose were the least important, with scores of 5.00 and 4.85, respectively. The other claims presented averages considered high, varying between 7.09 and 7.98.

The degree of importance attributed to the claims by groups A and C were similar, differing only when it comes to statements about the absence of Gluten and Lactose, which obtained higher levels of importance in Segment C (Table 3). The claims about gluten and lactose were much less interesting for segments A and B, with scores below 5.

Cluster B, in contrast to the others, showed a lower level of interest in the claims, with averages ranging from 3.62 to 5.64. The claims that stood out as most interesting for this segment, and with no statistical difference between them, were those related to the content of saturated/trans fats, proteins, fibers, vitamins, and minerals. The least interesting claims for this segment were those related to the content of calories, gluten, and lactose.

For the three segments, the claim “low saturated fat / no *trans* fat” was among the most important, while the claim about the absence of gluten was among the least important. It is noteworthy that segment C was the only one that gave scores higher than 5 for the claims about the absence of gluten and lactose.

Regarding preferences on claims at the time of purchase sweets or desserts, the data for each segment are listed in Table 4.



**Table 4.** Preference in claims of sweets and desserts.

<b>Preferreds claim*</b>	<b>Cluster A (n/% = 246/60.2)</b>	<b>Cluster B (n/% = 86/21.0)</b>	<b>Cluster C (n/% = 77/18.8)</b>	<b>p-value**</b>
Low energy / low calorie / light	42.3 a	30.2 b	20.8 b	0.001
Diet/ Zero / No added/ No sugar	50.8 a	44.2 a	53.2 a	0.461
Rich / source / high protein content	45.1 a	30.2 b	22.1 b	<0.001
Rich / Source / High Fiber	31.3 a	26.7 a	10.4 b	0.001
Zero / No lactose/ lactose free	0.4 c	22.1 b	67.5 a	<0.001
No Gluten / Gluten-Free	2.0 c	16.3 b	45.5 a	<0.001
Low total fat	29.7 a	22.1 ab	11.7 b	0.005
Low saturated fat/No trans fat	51.6 a	32.6 b	35.1 b	0.002
No-added-salt/ low-sodium	23.6 a	8.1 b	18.2 ab	0.007
Rich / source / high vitamin content	13.0 b	29.1 a	10.4 b	<0.001
Rich / Source / High Mineral Content	0.0 b	19.8 a	0.0 b	<0.001

\* Claim chosen as one of the 3 most preferred at the time of purchase of a sweet or dessert with claims. \*\* p-value<0.06 for chi-square test. Proportions followed by the same letter in the line show residues that do not differ significantly (p<0.06) from the adjusted residues corrected by Bonferroni.

In cluster A, in terms of relative frequency and in decreasing order, the most preferred nutritional claims were “low saturated fat/no trans fat” (51.6%), “diet/zero/no added/no sugar” (50.8%), “rich/source/high protein content” (45.1%) and “low energy/low calorie/light” (42.3%). The least preferred claims by this segment, with a very low frequency of choice, were those

related to the absence of lactose and gluten, and the presence of minerals, representing only 2%, 0.4%, and 0% of the consumer's choices, respectively.

For cluster B, the most preferred claim was “diet/zero/no added/no sugar” (44.2%), followed by the claim “low saturated fat/no trans fat (32.6%)”. The least claim preferred was that related to sodium content (8.1%).

For cluster C, in terms of relative frequency and in decreasing order, the most preferred label claims were: “zero/no lactose/lactose-free” (67.5%), “diet/zero/no sugar added” (53.2%), and “no gluten/gluten-free” (45.5%). The claim regarding the mineral content was not chosen by any of the members of group C as the preferred claim.

The results showed that between clusters A, B, and C there was no significant difference in preference concerning the claim “diet/zero/no sugar added”. This claim was among the favorites in the three segments, chosen by 50.8%, 44.2%, and 53.2% of consumers in clusters A, B, and C, respectively.

In relation to the other claims, there was a significant difference in the preferences of the clusters. Cluster A, when compared to the others, was the one that most preferred claims related to the content of saturated/*trans* fats, proteins, and calories, and the one that least preferred claims related to the content of gluten and lactose. Cluster C was the one that most preferred claims related to the content of gluten and lactose, and the one that least preferred claims related to the content of fibers. Cluster B was the one that most preferred claims related to the content of vitamins and minerals. The claim “rich/source/high mineral content” was not chosen as preferred by any consumer in clusters A and C.

Regarding the motivation to overpay for a sweet or dessert with the preferred claims, the data for the three segments are shown in Table 5.

**Table 5.** Motivation to overpay for sweets and desserts with preferential claims.

<b>Motivation to overpay for preferred nutritional claims</b>	<b>Cluster A (n/% = 246/60.2)</b>	<b>Cluster B (n/% = 86/21.0)</b>	<b>Cluster C (n/% = 77/18.8)</b>	<b><i>p</i>-value</b>
Upto 25% to overpaying	17.5	22.1	20.8	0.589
More than 25% to overpaying	82.5	77.9	79.2	

According to the results, there was no significant difference between the three consumer segments in terms of willingness to overpay for sweet or dessert with the preferred claims. In all groups, it was observed that the majority of consumers would be willing to pay above 25% on the price of the product.

### *3.3 Socioeconomic, health and nutrition aspects of the segments*

There was no significant difference between the three different consumer segments ( $p > 0.06$ ) regarding the socio-economic characteristics studied, indicating low heterogeneity of the study sample concerning gender, age, presence of children, income, and education.

Concerning the nutrition and health aspects, there was a significant difference ( $p < 0.06$ ) between the three consumer segments and the following variables: specific nutritional restrictions, lactose intolerance, gluten restriction, physical activity, and eating habits (Table 6).

**Table 6.** Cluster profiles based nutrition, health and label attention aspects.

Variable		Cluster A (n/% = 246/60.2)	Cluster B (n/% = 86/21.0)	Cluster C (n/% = 77/18.8)	p-value
Specific Nutritional Restrictions	Yes	15.0 b	19.8 b	45.5 a	<0.001
	No	85.0 a	80.2 a	54.5 b	
Lactose intolerance	Yes	4.1 c	12.8 b	33.8 a	<0.001
	No	95.9 a	87.2 b	66.2 c	
Gluten Allergy, gluten sensitivity or celiac disease	Yes	1.2 b	4.7 ab	6.5 a	0.032
	No	98.8 a	95.3 ab	93.5 b	
Physical Activity*	Active Lifestyle*	90.2 a	81.4 ab	79.2 b	0.016
	Sedentary Lifestyle	9.8 b	18.6 ab	20.8 a	
Mostly Healthy Food Choices**	Yes	69.9 a	55.8 b	64.9 a	0.058
	No	30.1 b	44.2 a	35.1 b	
Nutrition Knowledge***	Yes	65.0	64.0	51.9	0.111
	No	35.0	36.0	48.1	
Attention to Labels and Nutritional Information	Ever	52.4	52.3	45.5	0.736
	Always	27.6	31.4	33.8	
	Sometimes	19.9	16.3	20.8	

\* Physical Activity one or more times a week. \*\* Majority Healthy food choices - 60% or more of healthy daily food choices. \*\*\*knowledge from studies or professionals guidelines. Proportions followed by the same letter in the line show residues that do not differ significantly ( $p < 0.06$ ) from the adjusted residues corrected by Bonferroni.

According to Table 6, compared to group C, consumers in cluster A and B show fewer nutritional restrictions, including restrictions on lactose. The cluster B consumers stood out from the others for making less healthier food choices.

There was no significant difference between the three consumer segments regarding the level of knowledge in nutrition and the level of attention to labels. All groups showed a high level of knowledge in nutrition and attention to nutritional information on labels.

#### **4. Discussion**

As previously reported, three consumer segments were formed from their different levels of interest in nutrition claims of sweets and desserts, preferred claims at the moment of purchasing sweets and desserts, and willingness to overpay for sweets and desserts with preferred nutrition claims on the labels. Analyzing each group's interests for claims (Tables 3) and their motivations for overpaying for products with preferred claims (Tables 5), it can be seen that the investigation focused on studying a consumer profile quite interested in nutrition claims (79%), these being mainly centered in clusters A and C, and quite willing to overpay for products with preferred claims, with no difference among the three groups.

These findings, in conjunction with the general characteristics of the study population (topic 3.1), are in line with studies that state that generally women, with higher educational levels and nutrition knowledge are generally the most interested in claims and have a higher preference or higher purchase intention for products labeled with nutrition claims (Cavaliere et al., 2015; Vecchio, Ellen, Annunziata, 2016; Jurado & Gracia, 2017; Annunziata & Mariani, 2019; Ballico et al., 2019).

These sets of results also corroborate with studies that reveal that the greater the nutritional knowledge (Miller & Cassady, 2015, Steinhauser et al., 2019) or health motivation (Visschers, Hess, & Siegrist, 2010; Cavaliere et al., 2015; Hung et al., 2017; Steinhauser et al., 2019), the greater the frequency of reading and paying attention to the labels, as well as the likelihood of purchasing and choosing the product (Steinhauser et al., 2019).

Members of groups A and C, relative to those in group B, showed a greater interest in nutrition claims and stated that they had a healthier diet. These results indicate that the way consumers process nutrition claims is possibly affected by their eating habits, and that perhaps the healthier the diet, the greater the interest in claims. This hypothesis would be in line with authors who report that health and nutrition claims are more attractive to consumers interested in

healthy eating (Cavaliere et al., 2015; Annunziata & Mariani, 2019). Also in this regard, it is noted that the motivation for health, i.e, to live and eat healthily, is one of the most prominent factors on preferences and greater purchase intentions of products with health and nutrition claims, even surpassing the effects of knowledge in nutrition (Steinhauser & Hamm, 2018).

Also in this regard, although it is well established that individual concepts, definitions or perceptions of a healthy food choice or a healthy and nutritious diet are subjective and open to a wide range of interpretations, some authors nevertheless point out that "fruits" and "vegetables" are the terms most commonly used by consumers in such definitions (Lusk, 2019), while the content of "fats," "sugars," and "sodium" are the least used (Rizk and Treat, 2014; Lusk, 2019).

It is also known that the three groups did not differ with regard to stated nutritional knowledge. According to Cornish (2012) and Steinhauser and Hamm (2018), even if the consumer has a certain level of nutritional knowledge, it may not be used or transformed into behavior such as looking for and choosing healthier food. A certain level of motivation for health is necessary for consumers to really apply their knowledge of nutrition in a decision-making process about choosing healthier foods (Miller & Cassady, 2012; Bialkova et al., 2016).

The evidence from this research, on the possible positive effect of a healthy diet on the interest in claims, strengthens findings that state that health promotion actions should focus not only on educating about the nutritional aspects of foods but also on adopting measures that promote the adoption of healthier eating habits (Steinhauser & Hamm, 2018). These measures would result in greater consumer concern about the diet-health relationship and, consequently, greater use of the information on the label, as well as the improvement of healthy eating habits and health status of the population (Barreiro-Hurlé, Gracia, & de-Magistris, 2010; Kempen et al., 2012).

For the largest consumer group in the survey (group A), the claim "low saturated fat / no trans fat" had the highest level of importance among the 11 claims evaluated, this claim was also one of the most interesting for groups C and B. Moreover, this claim was also among the most preferred by most consumers of cluster A (51.6%), and by 32.6% and 35.1% of the consumers in aggregate groups B and C, respectively. These results indicate that a large proportion of the consumers in the research consider the presence of this claim very interesting and preferred on

the labels of sweets and desserts, i.e., they positively value this claim at the time of choosing and buying and would overpay for these products with this information.

The above-mentioned results are consistent with previous findings by Jurado & Gracia (2017), Øvrum, et al., (2012), and Van Wezemael et al. (2014), who found that the low saturated fat claim is one of the most positively valued claims in cookies, cheese, and beef, respectively. In a study conducted by Ballco et al. (2019) the nutritional claim that referred to the fat content was also one of the most preferred in the models studied. Previous studies by Krystallis and Chrysochou (2012) found that consumers have positive perceptions and attribute higher values to nutrition claims related to absence/reduction of fat and saturated fat content. Cavaliere et al. (2015) also found that statements regarding the absence/reduction of fat content (including saturated fats) are well accepted by consumers, being classified as “very” or “extremely” interesting by 36.7% of respondents. Finally, it is believed that the importance of this claim may be associated with the fact that decreasing fat intake, particularly saturated fats, may reduce the risk of chronic diseases (Lähtenmäki, 2013).

Segment C, the group with the highest average level of interest in claims, was the only one that attributed mean importance scores above 7 to claims about the absence of Gluten and Lactose. Most consumers in this segment (67.5%) also reported that the “zero/lactose-free/lactose-free” claim was one of the three most preferred. These results are in line with the occurrence of dietary restrictions in this group (Tab 6) and with research suggesting that the presence of personal pathologies, including dietary restrictions, positively affects the use, interest, and motivation for nutrition claims (Lähtenmäki, 2013; Jurado & Gracia, 2017; Hung et al., 2017). These results indicate that consumers in the research understood the meaning of these claims, which corroborates not only with their self-reported nutritional knowledge, but also with studies that highlight that nutritional knowledge plays an important role in how each claim is perceived (Andrews, Burton, & Netemeyer, 2013).

The "diet / zero / no added / no sugar" claim was one of the most preferred by the three consumer groups and with no statistical difference between them. This claim was among the three most preferred by 50.8, 44.2, and 53.2% of consumers in groups A, B, and C, respectively. These results are in agreement with the findings by Cavaliere et al. (2015), in which claims about

the sugar content were well accepted by consumers, being classified as "very" or "extremely" interesting by 34.2% of respondents. In a study conducted by Ballco et al. (2019) the "low sugar" claim was also one of the most preferred by consumers in terms of visual attention.

Claims associated with reduced or no trans/saturated fat content and sugars were among the most interesting and preferred claims for all groups, respectively. These results are consistent with the current epidemiological picture and with the main global measures for health promotion and healthy eating, which strongly aim to discourage the consumption of foods rich in these nutrients, which in excess collaborate with the increased risk of Non-communicable diseases (NCDs) (WHO, 2018, 2019).

A larger number of consumers in Cluster A preferred claims related to calorie and protein content, while a larger number of consumers in Cluster B preferred claims related to vitamin and mineral content. These results indicate that these consumers would be willing to overpay for sweets and desserts with these claims. For a better understanding of these and other motivations, we encourage that further studies are carried out, considering that a wide range of other aspects of consumers, not covered in this study, can influence the way they react to the presence of different nutrition claims (Annunziata & Vechio, 2013; Kaur et al., 2017; Ballco et al., 2019).

Finally, our research was limited to studying only one product category (sweets and desserts) and was based on self-reported data, which may be susceptible to social desirability bias. Thus, observational and experimental studies, involving other food categories, must be carried out.

## **5. Conclusion**

Three main consumer groups were found in our survey, two of which, representing 79% of all respondents (clusters A and C), were very interested in claims on the labels of sweets and desserts. These consumers, when in contrast to those in group B (group with the lowest level of general interest in allegations), claimed to follow a healthier diet.

Our research findings suggest that eating habits possibly impact the level of interest in claims, and that healthier eating habits would be positively related to greater interest in this label



information. Given this, we understand that policies that encourage not only nutrition education and label reading, but also the adoption of healthier eating habits, are necessary to promote the interest of potentially healthier packaged foods, which could consequently lead to an overall improvement in consumers' eating habits.

Finally, consumer interests and preferences in the three groups focused on claims about the absence of saturated/trans fats and sugars, respectively. Thus, to offer products not only healthier and in line with what is recommended by global health agencies, but also capable of effectively reaching and serving different types of consumers with a focus on health and well-being, we suggest that manufacturers offer sweets and desserts reduced or excluded from saturated/trans fats and sugars.

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### Conflict of interest

The authors declare no conflict of interest.

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## **ARTIGO 2 - HEALTH AND WELL-BEING ORIENTED CONSUMERS: PERCEPTIONS AND PREFERENCES TOWARDS HEALTHY SWEET SNACKS**

Versão preliminar para submissão e envio à revista científica *International Appetite International Research Journal*. O conselho editorial do periódico poderá sugerir alterações para adequá-lo ao seu próprio estilo.

## Health and Wellness-Oriented Consumers: Perceptions and Preferences for Healthy Sweet Snacks

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## **Abstract**

The population interest in a practical and healthy diet has increased in recent years. In this context, in order to meet the specific demands of this market segment composed mainly of consumers looking for ready-to-eat foods, such as sweet snacks, with health value proposals, this study aimed to: (i) to understand the different profiles of health and wellness-oriented consumers according to their different food choice motivations and their self-perceptions regarding diet, exercise level, weight, and body composition, and (ii) to understand their preferences towards healthy sweet snack ingredients. The survey was carried out via an online questionnaire that was answered by 379 consumers with a health and wellness oriented profile. Three consumer segments, clusters A, B, and C, were identified. Cluster B, the largest group, was motivated mainly by the "quality of life". Those consumers were concerned with improving health, longevity, and disease prevention. The food choices of clusters A and C were mainly motivated by the "Weight" and "Aesthetics", respectively, i. e, most of those consumers were concerned with factors that relate to their body image. A higher preference for healthy sweet snacks using natural ingredients was observed for all three clusters, while additives or too many ingredients showed higher rejection. Our study also revealed a potential for manufacturing products with organic ingredients (clusters A and B), natural sugar substitutes (clusters A and C), and protein ingredients (cluster C). Thus, the results showed that a new generation of healthy sweet snacks made mainly from few ingredients and natural ingredients, i. e, following the trend of clean label products, could be the most promising responses of healthy sweet snack manufacturers to the growing demand for healthier, natural, and practical foods.

**Keywords:** Consumer profile, food attitudes, ready-to-eat food products, packaged foods, food ingredients, food additives.

## 1. Introduction

A niche market, which is mainly composed of health and wellness-oriented consumers, is emerging that is increasingly conscious and demanding of its food choices (Nielsen, 2016; Euromonitor International, 2018). Those consumers perceive that healthy eating is related to overall good health and a better quality of life (Nielsen, 2016; Stok et al., 2018; Martins et al., 2019).

These changes in consumer behavior also affect the health food market which is growing approximately 1.8% per year (Euromonitor International, 2018). Global food companies have increasingly sought to develop products with an emphasis on health-related value propositions to meet new consumer demands (Euromonitor International, 2018). It is noticed a growing demand and supply of product categories called "clean label", "free from", "naturally healthy", "organic", "fortified", "functional", "vegan", "plant-based", among others (Sethi, Tyagi, & Anurag, 2016; Mcfadden & Huffman, 2017; Euromonitor International, 2018; Martins et al., 2019; Schnettler et al., 2019).

It is also observed a growing demand for products that fit the "guilt-free indulgence" trend. Those are products generally provided in small portions (snacking/finger food), with nutritional appeals focused on health and well-being, reduced in calories and added with healthy and/or functional ingredients (Euromonitor International, 2018; Schlinkert et al., 2020). Ready-to-eat snacks are a global trend as they allow the modern consumer to save time and effort (Schlinkert et al., 2020). Amid those trends, the sector of ready-to-eat sweets and desserts with an appeal to health stands out, due to the enormous potential for entrepreneurship (Weisberg, 2017; TECHNOMIC, 2018, 2019; Lindell, 2020; Friedberg, 2020).

The success of this type of entrepreneur depends on several factors. The manufacturer needs to have in-depth knowledge about the process of developing new products and the most varied types of ingredients and additives. In fact, it is also important to understand the desires and demands of different consumer profiles (TECHNOMIC, 2019).

Despite several studies to elucidate consumer behavior, it is known that the food choice process is always a highly complex and difficult to understand mechanism, which goes far beyond a simple nutritional issue (Lusk, 2019b; Steinhauser, Janssen, & Hamm, 2019; Pinto et al., 2021). In this way, food choice models demonstrate that "value negotiations" play an influential role in food decisions and that individuals make food choices taking into account the personal elements most important to them (Sobal & Bisogni, 2009).

The human food choice, as well as each individual perception of "healthy eating" are subjective and inherent to many factors, including personal motivations and interests; therefore, manufacturers must always take into consideration the well-being, preferences and needs of each type of consumer (Paquette, 2005; Carels, Konrad, & Harper, 2007; Monterrosa et al., 2020; Pinto et al., 2021). Exploring those factors and how they explain or encourage healthy eating attitudes are also important and necessary efforts in promoting habit change (Jomori, Proença, & Calvo, 2008; Sun, 2008; Asioli et al., 2017; Annunziata & Mariani, 2019; Steinhauser et al., 2019).

Variables related to individual motivation for "health, quality of life and well-being" are essential in studies on consumer behavior since they have a great impact on perceived healthiness of food. Based on that, previous studies have identified the relationships between demographic characteristics and health concerns, food choice motivations, attitudes toward healthy eating, and eating behavior (Miller & Cassady, 2015; Fenko, Kersten, & Bialkova, 2016; Hung et al., 2017; Steinhauser et al., 2019; Annunziata & Mariani, 2019). However, none of those authors studied in depth the effects of relationships between some specific food motivators related to health and well-being, and food preferences on consumer perception.

It is known that self-perception of image and body weight, for example, may be among the most important determinants of eating behaviors; therefore, they should be considered as predictors of food choice in promoting healthy eating (Carraça et al., 2011; Gaylis, Levy, & Hong, 2020; Rounsefell et al., 2020; Niswah, Rah, & Roshita, 2021; Pinto et al., 2021; Dias et al., 2021).

Factors, such as the pursuit of health and longevity, treatment or control of food-related comorbidities, presence of specific dietary restrictions or needs, exercise level and eating habits,

are also important in studies on consumer behavior, food choices and healthy diets (Caprara, 2018; Schulze et al., 2018; Govindaraju et al., 2018; Monterrosa et al., 2020; Pinto et al., 2021; Enriquez & Archila-Godinez, 2021; Gargano et al., 2021).

Other important variables, such as "aesthetics", "weight loss/control", "control of comorbidities", "specific dietary needs", "longevity/disease prevention", among others, are also important in those type of studies (Sun, 2008; Sobal & Bisogni, 2009; Bucher et al., 2016; Ghvanidze, et al., 2017; d'Angelo et al, 2020).

Studies that collectively address all of the above variables, as well as their relationships to healthy food choices, are extremely important to provide food manufacturers with information that will help them develop new products that are not only healthier, but that effectively meet the expectations and interests of consumers. At the same time, this information can also be useful in health promotion strategies.

In this context, this study aimed (i) to trace and understand the different profiles of health and wellness-oriented consumers according to their different food choice motivations, such as "quality of life", "weight" and "aesthetics", and their self-perceptions regarding diet, weight, and body composition and (ii) to understand their perceptions and preferences towards ingredients for healthy sweet snacks.

## **2. Methodology**

### **2.1 Survey Plan**

This is a descriptive study, with a cross-sectional configuration and quantitative approach (Malhotra, Nunan, & Birks, 2017). An online questionnaire, structured with closed-ended questions, was applied by convenience to a non-probability sample (Guerrero et al., 2010).

The content of the questionnaire was pre-tested with a pilot sample of 40 consumers before proceeding to the main survey. Both the pre-test and the main survey were only conducted after the approval of the project by the Ethics Committee for Research with Human Beings

(COEP), under protocol CAAE (26806919.3.0000.5148), according to the National Health Council (Brasil, 2012).

The content of the questionnaire was based on what was proposed by Cavaliere, Ricci, & Banterle, 2015 and Annunziata & Mariani, 2019, and addressed variables related to the socio-economic and health conditions of the participants, their health motivations (quality of food choices and physical activity), nutritional knowledge, and labeling attention habits (Cavaliere, Ricci, & Banterle, 2015; Annunziata & Mariani, 2019).

The main predictor questions of the questionnaire, addressing food choice motivators related to health, quality of life, and overall well-being, were based on studies suggesting that such variables have a major impact on perceived healthiness of food, as well as its purchase and choice (Bucher et al., 2016; Hung et al., 2017; Ghvanidze, et al., 2017; Asioli et al., 2017; Caprara, 2018; Schulze et al., 2018; Govindaraju et al., 2018; Steinhauser et al., 2019; Annunziata & Mariani 2019; Jáuregui, 2020; Gaylis, Levy, & Hong, 2020; Rounsefell et al., 2020; d'Angelo et al, 2020; Monterrosa et al., 2020; Pinto et al., 2021; Gargano, et al., 2021; Enriquez & Archila-Godinez, 2021; Monteiro et al., 2021; Niswah, Rah, & Roshita, 2021; Dias et al., 2021).

In line with previous research on consumer profiles, consumer heterogeneity was considered through segmentation by characteristics using the Clusters methodology (Cavaliere, et al., 2015; Jurado & Gracia, 2017; Annunziata & Mariani, 2019; Ballco et al., 2019; Nobrega, Ares, & Deliza, 2020).

## **2.2 Questionnaire content**

The questionnaire was divided into 4 sections: (I) Criteria for fitting the target population of the study; (II) aspects related to food choice motivations and self-perceptions of diet, weight and body composition; (III) preferences regarding healthy sweet snacks ingredients and (VI) socioeconomic aspects.

The respondents had to answer 4 specific questions in the section I of the questionnaire to assess whether they were part of the target population of the study: Age; frequency of



consumption of products from health food stores; frequency of consumption of sweet food products and frequency of reading label information. Only participants over 18 years old, who consume at least once a month sweets and/or desserts and products from health food stores, and who read, even if rarely, the information on the labels of the food products they consume, were included in the survey.

Aspects related to food choice, diet, weight and body composition were evaluated using 6 multiple-choice questions answered by consumers in section II: Food choice motivator associated with health and well-being, self-perceptions regarding body weight, body muscle mass, body fat, level of exercise, and overall diet quality. The motivating factor of food choice was evaluated using a qualitative multiple-choice single-answer question. The perceptions of the participant of their own weight and body composition (muscle mass and fat) were assessed through three multiple choice questions using a 5-point Likert scale of satisfaction (1 = much lower than desired, 5 = much above than desired). The self-perceptions of the participant regarding level of exercise and diet quality were evaluated using two questions with a 5-point Likert scale of intensity (from 1 = Extremely Inactive or Sedentary to 5 = Extremely Active or Athlete and from 1 = Very unhealthy and nutritious to 5 = Very healthy and nutritious).

Consumer preferences regarding healthy sweet snacks ingredients were assessed using 3 multiple choice questions in the section III: Preferred ingredient type for healthy sweet snacks; most disliked ingredient type for healthy sweet snacks and preferred ingredient type to sweeten healthy sweet snacks.

The socioeconomic aspects were collected using 5 multiple choice questions in section IV: Gender, age, education, children, and family income.

### **2.3 Sampling and data collection**

To meet the prerequisites of the research and to ensure that the recruited participants were potential health and wellness oriented consumers, a non-probabilistic sampling for convenience was carried out (Guerrero et al., 2010) followed by the use of specific exclusion criteria (session 1 of the questionnaire).

The questionnaire, sent to 4,000 people between the months of February and April 2020, obtained a response rate of 13%. Of the 520 respondents, 379 (72.88%) met the established criteria regarding the target audience of the survey. The sample size was larger than necessary, taking into account an error level of about 5% (Kadam & Bhalerao, 2010).

## **2.4 Data analysis**

Data analysis included descriptive statistics (relative frequency), bivariate (chi-square test and one-way analysis of variance) and multivariate analysis (cluster analysis). The reliability of the Likert scale questionnaire questions was determined by Cronbach's alpha coefficient ( $p < 0.05$ ), where a coefficient greater than 0.700 represents acceptable internal consistency (Taber, 2018).

Cluster analysis using Euclidean distances and Ward's hierarchical clustering method was applied to identify and classify the consumer profiles. From the predictor variables of section II of the questionnaire, the cluster analysis consisted in determining groups that are internally homogeneous, heterogeneous among themselves, and mutually exclusive. Thus, the number of segments or clusters, based on their differences regarding food choice motivations and self-perceptions of diet, weight and body composition, was determined based on the highest density of pseudo-value F of Calinski-Harabasz and observation of the dendrograms.

Data of the variables evaluated by 5-point Likert scale were subjected to Kruskal-Wallis test ( $p < 0.05$ ), and comparisons among clusters were performed by Dunnett's test ( $p < 0.05$ ). The chi-square test was applied to verify associations between the clusters formed and the other study variables. For significant associations ( $p < 0.05$ ), post hoc analysis using adjusted residuals was applied (z-scores), tested against Bonferroni corrected p-values (Macdonald & Gardner, 2000).

An ideal healthy sweet snack for each group was suggested using word clouds generated from the most frequent responses obtained on the following questions: Preferred ingredient type for healthy sweet snacks and preferred ingredient type to sweeten healthy sweet snacks. The words in the clouds had a variable font size according to the frequency of the respondents.

Non-descriptive words, such as "ingredient", or mentioned with a frequency of less than 5% were removed from the word clouds.

All statistical analyses were performed using R software (version 4.1.0) and the SPSS (Statistical Package for Social Sciences) software version 20.

### **3. Results**

#### **3.1 Characteristics of the consumers - Socioeconomic Aspects**

According to the criteria used in this study, all survey participants were over 18 years old, usually read the labels on packaged foods and, at least once a month, used to consume packaged sweet food products and products from health food stores.

According to the socioeconomic characteristics (Table 1), the most consumers were female (78.4%), aged between 25 and 59 years (81%) and without children (63.6%). With regard to income and education level, 52.8% of the consumers claimed to have a family income equal to or greater than 5 minimum wages and 78.3% claimed to have a college degree as the minimum level of education.

**Table 1.** Socioeconomic characteristics of participants (n=379).

Socioeconomic Characteristics		Sample n (%)	National Population* (%)
Gender	Female	297 (78.4%)	52.6
	Male	82 (21,6)	47.4
Age	18 to 24	67 (17.7)	12.2
	25 to 39	184 (48.5)	27.4
	40 to 59	123 (32.5)	32.6
	60 or more	5 (1.3)	20.1
Education level	Primary school	0	50.5
	Secondary school	19 (5.0)	2.8
	Unfinished college degree	63 (16.6)	5.5
	Complete college degree	110 (29.0)	15.2
	Post-graduate	187 (49.3)	n.a
Children	Yes	138 (36,4)	n.a
	No	241 (63,6)	n.a
Family income in minimum wages**	0 to 2	73 (19.3)	23.9
	2 to 5	106 (28.0)	49.1
	5 to 10	123 (32.5)	14
	10 to 25	54 (14.2)	10.3
	Above 25	23 (6.1)	2.7

\*Official data from the Brazilian Institute of Statistics and Geography on the socioeconomic indicators of the Brazilian workforce (age > 14) (IBGE, 2020b). \*\* The minimum wage in Brazil in 2020 was 1,045 BRL (US\$ 232.00) (Brasil, 2020).

### **3.2. Consumer segmentation - Food choice, diet, weight and body composition aspects**

In this study, the food choice motivators and the self-perceptions of body weight, body muscle mass, body fat, exercise level, and diet, were used as factors to create three consumer segments, the clusters A, B and C (Table 2). Clusters A, B, and C were composed of 24.5%, 55.1%, and 20.3% of the research participants, respectively, and were not statistically different from each other ( $p>0.05$ ) with regard to the socioeconomic aspects assessed in this study (Table 1).

**Table 2.** Food choice motivator most prioritized by consumers

<b>Diet guide factor</b>	<b>Cluster A (n/% = 93/24,5)</b>	<b>Cluster B (n/% = 209/55,1)</b>	<b>Cluster C (n/% = 77/20,3)</b>	<b>p-value</b>	<b>Total sample (n/%=379/100)</b>
Aesthetics*	0.0 b	1.0 b	100.0 a	<0.001	20.8
Life quality**	0.0 b	87.1 a	0.0 b	<0.001	48.0
Weight***	57.0 a	0.0 b	0.0 b	<0.001	14.0
Specific diet****	23.6 a	0.0 b	0.0 b	<0.001	5.8
Health condition*****	19.4 a	0.0 b	0.0 b	<0.001	4.7
None of the alternatives	0.0	11.9	0.0	-	6,7

\*Lean muscular body, muscle hypertrophy or fat spot reduction. \*\*Reduced risk of illness and longevity. \*\*\*General weight loss, control or maintenance in order to achieve greater well-being, quality of life and/or healthier condition. \*\*\*\*Who follow a specific diet: vegetarian, vegan, low carb, raw food diet, among others. \*\*\*\*\*In order to treat or control any specific disease or comorbidity, such as diabetes, obesity, anemias, malnutrition, bowel diseases, severe intolerances, high blood pressure, among others. Proportions followed by the same letter in the line show residues that do not differ significantly ( $p < 0.05$ ) from the adjusted residues corrected by Bonferroni.

Most consumers in the Cluster A claimed to use the “weight” factor as the most important variable when making food choices. In other words, 57% of those consumers seek to make their food choices prioritizing weight control or weight loss. “Health condition” and “specific diet” were other important factors observed when making food choices in this cluster. A specific diet, such as a vegetarian, vegan, raw food diet, among others, is followed by 23.6% of those consumers. Moreover, 19.4% of those consumers stated have some comorbidity, that is, some disease that food is one of the key control factors.

The vast majority of the consumers in the cluster B (87.7%) claimed that “quality of life” is the primary food choice motivator. These results reveal that those consumers are concerned not only with health maintenance, but also with disease prevention and longevity.

All consumers in cluster C (100%) stated that “aesthetics” is the most important factor driving their food choices. Those consumers aim probably to consume foods that help them achieve specific aesthetic goals, such as an increase of the lean muscular body, fat spot reduction, or muscle hypertrophy.

When analyzing the general study population, an expressive number of 48% of all consumers in the survey (Cluster B) indicated that they use the “quality of life” parameter as a primary factor for their food choices.

As for consumer perceptions regarding diet quality, weight, and body composition, data for each cluster are listed in Table 3.

**Table 3.** Consumer self-perceptions regarding the level of diet quality, exercise, weight and body composition.

<b>Self-perceptions (Cronbach's Alpha = 0.888)</b>	<b>Cluster A (n/% = 93/24,5)</b>	<b>Cluster B (n/% = 209/55,1)</b>	<b>Cluster C (n/% = 77/20,3)</b>	<b>p-value</b>	<b>Total sample (n/%=379/100)</b>
Diet quality*	3.65 ± 0.97 a	3.83 ± 0.89 a	3.88 ± 0.87 a	0,141	3.79 ± 0.91
Level of exercise**	2.43 ± 0.96 b	2.64 ± 0.97 b	3.18 ± 0.82 a	<0.001	2.70 ± 0.97
Weight perception***	3.84 ± 0.78 a	3.42 ± 0.74 b	3.49 ± 0.72 b	<0.001	3.54 ± 0.76
Body fat perception***	4.09 ± 0.67 a	3.78 ± 0.63 b	3.91 ± 0.63ab	<0.001	3.88 ± 0.65
Muscle mass perception***	2.41 ± 0.92 a	2.31 ± 0.79 a	2.14 ± 0.70 a	0,157	2.30 ± 0.81

\*The numerical average for a 5-point Likert scale, where 1 is "very unhealthy and not nutritious"; 2 is "unhealthy and not nutritious"; 3 is "neither unhealthy/not nutritious nor healthy/nutritious"; 4 is "healthy and nutritious"; 5 is "very healthy and nutritious". \*\*The numerical average for a 5-point Likert scale, where 1 is "extremely inactive (sedentary)"; 2 is "little inactive"; 3 is "active"; 4 is "very active"; 5 is "extremely active (athlete)". \*\*\* The numerical average for a 5-point Likert scale, where 1 is "much lower than desired"; 2 is "a little lower than desired"; 3 is "neither above nor below desired"; 4 is "a little higher than desired"; 5 is "much higher than desired". Proportions followed by the same letter in the line show residues that do not differ significantly ( $p < 0.05$ ) from the adjusted residues corrected by Bonferroni.



No difference was found among the three consumer clusters for the general diet quality. The average of the three groups, that is, of the entire study population, was 3.79. This indicates that the diet of the survey consumers is closer to being better represented by the term “healthy and nutritious”, according to themselves.

Cluster C presented an average higher than the other consumer groups for level of exercise. Its mean was 3.18, where 3 represents “active” individuals. Clusters A and B did not differ from each other, with averages of 2.43 and 2.64, respectively. According to the Likert scale, 2 means “little active” and 3 “active”. Therefore, to facilitate understanding, we assumed that those individuals, grouped between those values, perceived their exercise level as "moderately active".

Consumers in Cluster A presented a higher average for the perception of body weight compared to the other groups. The average of this group was 3.84, which was rounded to 4. This value on the Likert scale represented a perception of weight as “a little higher than desired”. The means of clusters B and C, of 3.42 and 3.49, respectively, did not differ from each other. This means that those individuals stated their own weight between “neither above nor below desired” and “a little higher than desired”, according to themselves. Here, in order to facilitate understanding, we assume that those individuals therefore perceive their weight as "slightly higher than desired".

Cluster A and B presented the highest and the lowest averages for the perception of body fat, respectively. In addition, all the three groups presented averages close to 4. This value on the Likert scale represents a self-perception of body fat "a little higher than desired".

There was no difference among the three consumer clusters for the perception of muscle mass. The overall mean of the study population was 2.28. The nearest nominal value on the Likert scale is 2, which represents a “little lower than desired” muscle mass.

### **3.3 Segment preferences on healthy sweet snack ingredients**

As for consumer preferences for ingredients of healthy sweet snacks, the data for each cluster is listed in Table 4.

**Table 4.** Preferred ingredients for healthy sweet snacks.

<b>Preference on Types of Ingredients</b>	<b>Cluster A (n/% = 93/24,5)</b>	<b>Cluster B (n/% = 209/55,1)</b>	<b>Cluster C (n/% = 77/20,3)</b>	<b>p-value</b>	<b>Total Sample (n/%=379/100)</b>
Organic	19.4 ab	28.2 a	9.1 b	0,002	84 (22.2)
Natural	47,3 a	48,3 a	50,7 a	0,906	184 (48,5)
Plant-based	8.6 a	1.4 b	2.6 ab	0,006	13 (3.4)
Non-transgênic	1,1 a	4,3 a	2,6 a	0,318	12 (3.2)
Proteic	9.7 b	9.1 b	24.7 a	0,001	47 (12.4)
None of options	13,9 a	8,7 a	10,3 a	0,366	39 (10.3)
p-value	<0,001	<0,001	<0,001		

Proportions followed by the same lowercase letter in the row and by the same uppercase letters in the column show residues that do not differ significantly ( $p < 0.05$ ) from the adjusted residues corrected by Bonferroni.

Most consumers, in all three groups and with no difference between them, claimed to prefer “natural” ingredients for healthy sweet snacks. In other words, they prefer healthy sweet snacks made without the addition of artificial additives of any kind. Those consumers represented 48.5% of the general study population.

Organic ingredients were also preferred by a significant portion of the consumers in the survey (22.2%). These were more concentrated in groups A and B, with no differences between them.

Protein ingredients were more preferred by consumers in cluster C (24.7%). Therefore, Cluster C, more than the others, prefers healthy sweet snacks that contain protein ingredients, such as whey protein.

Plant-based ingredients showed the highest and the lowest preference by consumers in the Clusters A and B, respectively. The consumer preference for plant-based ingredients represented 3.4% of the general study population.

No difference was found in the preference for non-transgenic ingredients among the three consumer clusters. The consumer preference for non-transgenic ingredients represented 3.2% of the study population.

A list of the types of ingredients most disliked (or most rejected) by consumers is shown in Table 5.

**Table 5.** Most disliked ingredients types for healthy sweet snacks.

<b>Most disliked ingredient types .</b>	<b>Cluster A (n/% = 93/24,5)</b>	<b>Cluster B (n/% = 209/55,1)</b>	<b>Cluster C (n/% = 77/20,3)</b>	<b>p-valor</b>	<b>Total Sample (n/%=379/100)</b>
Compound ingredients with many ingredients*	22,6 Aa	29,2 Aa	35,1 Aa	0.197	109 (28.8)
With a complex or unknown name	22,6 Aa	14,8 Ba	11,7 Ba	0.119	61 (16.1)
Sugars/glycides**	12,9 Aa	9,1 Ba	15,6 ABa	0.265	43 (11.3)
Food additives***	24.8 Aa	34.0 Aa	24.7 ABa	0.184	114 (30.1)
None of options	17.1 Aa	12.9 Ba	12.9 Ba	0.588	52 (13.7)
p-value	0.244	<0.001	<0.001		

\*Compound ingredient: Ingredient stated in the ingredients list, followed by a list, in parentheses, of its ingredients in descending order of proportion (BRASIL, 2002). \*\*Examples presented in the questionnaire: Sugar (Sucrose), Glucose, Fructose, Maltodextrin, and Corn Syrup. \*\*\*Thickeners, sweeteners, preservatives, and coloring agents. Proportions followed by the same lowercase letter in the row and by the same uppercase letters in the column show residues that do not differ significantly ( $p < 0.05$ ) from the adjusted residues corrected by Bonferroni.

"Additives" and "Compound ingredients with many ingredients" were among the most rejected ingredients by all three groups and with no statistically significant differences between them. In all, 58.9% of the entire study population (cumulative frequency) rejected one of these types of ingredients.

Ingredients "with a complex or unknown name" were rejected by 16, 1% of the total study population. Although there were no significant differences between the groups, only for group A this type of ingredient was among the most rejected.

Ingredients of the "sugars/glycides" type were rejected by only 11.3% of the total study population. Although there were no significant differences between the groups, for groups A and C this type of ingredient was among the most rejected.

Consumer preferences for ingredients to sweeten healthy sweet snacks are presented in Table 6. In general, consumers in the study population showed a higher preference for sugars in general (54.9%). Although this ingredient is among the most preferred for sweetening in all three groups, it is preferred by more consumers in groups A and B than in C.

**Table 6.** Preferences of ingredients to sweeten healthy sweet snacks.

<b>Preferred ingredient to sweeten</b>	<b>Cluster A (n/% = 93/24,5)</b>	<b>Cluster B (n/% = 209/55,1)</b>	<b>Cluster C (n/% = 77/20,3)</b>	<b>p-value</b>	<b>Total Sample (n/%=379/100)</b>
Natural sugar substitutes*	33,3 Bab	27,3 Bb	45,4 Aa	0.014	123 (32,5)
Artificial sugar substitutes**	6,4 Ca	8,1 Ca	3,9 Ba	0,446	26 (6,9)
Sugars in general	55,9 Aa	60,3 Aa	39,0 Ab	0,006	209 (54,9)
None of Options	4,4 Cb	4.3 Cb	11,7 Ba	0.047	22 (5,8)
p-value	<0.001	<0.001	<0.001		

\*Examples presented in the questionnaire: Honey, brown sugar, sugar cane molasses, coconut sugar, demerara sugar. \*\*Examples presented in the questionnaire: Sucralose, acesulfame-K, sodium cyclamate, saccharin. Proportions followed by the same lowercase letter in the row and by the same uppercase letters in the column show residues that do not differ significantly ( $p < 0.05$ ) from the adjusted residues corrected by Bonferroni.

In general, consumers in the study population presented the highest preference for the sugars in general (54.9%), these were more often in Clusters A and B than in C.

A significant portion of the population also claimed to prefer natural sweeteners for sweetening (32.5%). Although this ingredient was the most preferred only for group C, there were no significant differences in this regard between the consumers in this group and group A.

Artificial sweeteners were the least preferred type of sweetening ingredients by consumers in the survey (6.9%), with no difference between the three consumer groups.

Based on the data described so far regarding preferred ingredients in general (Table 4), and preferred ingredients for sweetening (Table 6), word clouds were used to illustrate the concept of an "ideal healthy snack" for each consumer group (Figure 1).

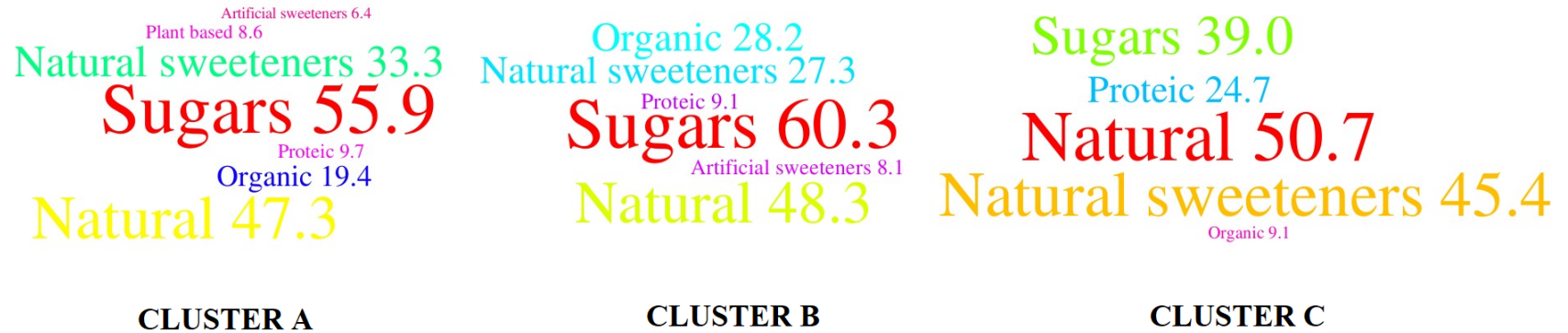


Figure 1. Word clouds used to illustrate ideal healthy sweet snacks, according to the preferred types of ingredients by each consumer cluster. The response frequencies were compiled from Tables 4 and 6.



It is clearly observed through the clouds that healthy sweet snacks made with natural ingredients were very highlighted for the three consumer clusters. Organic ingredients were more highlighted for the clusters A and B, whereas protein ingredients, such as whey protein, were more highlighted by consumers of the cluster C. About sweeteners, sugar was very highlighted by clusters A and B, nevertheless, natural sweeteners also much stood out for the clusters A and C.

## **4. Discussion**

### **4.1. Participant characteristics and segmentation**

The results on the general socioeconomic characteristics of the research participants (Topic 3.1), as well as their aspects linked to health, diet, physical activity and label reading habits (Topic 3.2), reveal that the research focused on the study of a general consumer profile which is in line with what was already expected for the target audience and also described in several studies focusing on health and wellness-oriented consumers. Those studies indicate that these consumers are generally women, over the age of 25, engage in some physical activity, eat a healthy diet, are interested in nutritional information on food labels, and have higher education and purchasing power (Beardsworth et al, 2002; Malinauskas et al. 2006; Drichoutis et al, 2008; Kempen et al., 2012; Miller & Cassady, 2015; dos Santos et al., 2021).

These survey consumers were segmented into three different consumer groups according to their differences regarding the motivators of food choice and their self-perceptions of body weight, body muscle mass, body fat, exercise level, and diet. No difference was found in the formed clusters for the socioeconomic aspects, therefore, those characteristics were similar among the clusters and indistinguishable from the general population of the study. This phenomenon was expected since this study focused on a specific market niche, health- and wellness-oriented consumers (Beardsworth et al., 2002; Malinauskas et al., 2006; Drichoutis et al., 2008; Kempen et al., 2012; Miller & Cassady, 2015).

There was also no difference between consumer groups for "diet quality," which was self-perceived by consumers as "healthy and nutritious" (Table 3). In this regard, although it is well established that individual concepts, definitions or perceptions of a healthy food choice or a healthy and nutritious diet are subjective and open to a wide range of interpretations, some authors nevertheless point out that "fruits" and "vegetables" are the terms most commonly used by consumers in such definitions (Lusk, 2019), while the content of "fats," "sugars," and "sodium" are the least used (Rizk and Treat, 2014; Lusk, 2019). In Anyhow, consumers' self-perception of diet corroborates with previous studies that highlight that culturally women are the most concerned about health and body shape, which is reflected in food choices with higher adherence to healthy eating patterns when compared to men (Knudsen et al, 2014; Leblanc et al., 2015; dos Santos et al., 2021).

No difference was found among the consumers of the three groups for the "muscle mass" factor as well (Table 3). Consumers in the study population self-rated their muscle mass as "a little lower than desired". Although we did not assess the nutritional characteristics of the diet of the survey consumers or the types and intensity of exercise performed by them, what is known in this regard is that lean mass loss is common in adults and is mainly associated with advancing adulthood, low protein intake, and lack of strength exercises (Kamel, 2003; Mithal et al., 2013; Ranganathan et al., 2016).

Despite the similarity among the consumer clusters regarding socioeconomic aspects and self-perceptions of "diet quality" and "muscle mass", differences were found among the clusters related to the factors "food choice motivator", "weight", "body fat" and "level of exercise" (Table 2 and 3).

Cluster B was mainly characterized by individuals who chose the "quality of life" factor as the most important motivator for their food choices. This cluster, the largest group of consumers, represented almost half of the entire population in this study (48%). Those consumers are more concerned about consuming foods that support the overall health maintenance, longevity and disease prevention. They also tend to consider themselves to be "moderately active". Their weight and body fat were self-perceived as "slightly higher than desired" and "a little higher than desired", respectively.

The motivations of these consumers reflect the growing movement observed around the world of greater concern about health, disease prevention and longevity. Those motivations are also reflected in the food choices (Küster-Boluda and Vidal-Capilla, 2017; Iwatani e Yamamoto, 2019; Statista, 2020). Consumers seek not only to treat diseases, but also seek to prevent them through improved health and diet (Ozen et al., 2012; Purwaningsih et al., 2021). Moreover, those motivations also reflect the current growing demand for functional foods. Those products meet the demand of those consumers, who seek benefits beyond basic nutrition through their diet (Küster-Boluda and Vidal-Capilla, 2017; Statista; 2020). More specifically, functional foods are foods or food components capable of providing proven physiological benefits and/or reducing the risk of chronic diseases (Health Canada, 1998; Iwatani & Yamamoto, 2019).

Cluster A was mainly characterized by individuals who prioritize “weight” as the main motivator for their food choices. Therefore, this consumer cluster is more concerned with the consumption of foods that help control, maintain or lose weight. Part of the consumers in this cluster also claimed to prioritize factors to adjust to a "specific diet” or "health condition". In this way, these consumers are also interested in the consumption of foods that meet their specific dietary needs or that help the control of some health comorbidities that can be influenced by nutrition, such as diabetes, obesity, high blood pressure, among others. These consumers tend to consider themselves “moderately active” and that their weight and body fat are “a little higher than desired”.

These results are in line with studies that point out that women in general, more than men, seek a healthy diet to improve body shape and body weight (Beardsworth et al., 2002; Malinauskas et al., 2006; Quittkat et al., 2019). The food choice motivators prioritized by this group also point to the potential of the food market for weight management or for special medical purposes. In general, those types of foods are specially formulated or processed to meet differentiated and/or optional diets, and the needs of individuals with specific metabolic and physiological conditions (European Commission - EC, 2013).

All Cluster C, comprising 20.3% of the study consumers, stated to prioritize “aesthetics” as the main motivator for their food choices (Table 2). In this way, this consumer cluster prioritizes the intake of foods that help them achieve specific aesthetic goals, such as muscle

hypertrophy, increase of lean muscular body and/or fat reduction, among others. Those consumers tend to consider themselves as “active” for their level of exercise. The perception for their weight was “slightly higher than desired” and for their body fat was “a little higher than desired”.

As for the food motivations of consumers in cluster C, it is known that women may be more concerned than men about their body shape (del Mar Bibiloni et al., 2017). However, it is also important to relate the effects of social media use on individual perceptions of their self-image. As the questionnaires were answered by users of the social network Instagram, those perceptions of self-image could also reflect on the food choices of the consumers in this study.

It is known that the social media use or image exposure can negatively impact the human self-image and food choices (Meier & Gray, 2014; Rounsefell et al., 2020). Furthermore, women tend to perceive a negative body image more often than men, according to previous studies (Wang et al., 2009; del Mar Bibiloni et al., 2017; Quittkat et al., 2019; Rounsefell et al., 2020). As a result, those women seek to have a slim body to adjust to abstract social ideals shaped by the media and their peers (Lemon et al., 2009).

Finally, the motivations, characteristics, preferences, as well as the higher level of exercise by the consumer group C, point to the possible potential of protein foods or supplements. According to Kårlund et al. (2019), protein and amino acid supplements are widely marketed for habitually active consumers that seek for muscle growth and performance-enhancing products, and high-protein, low-carbohydrate diets, which are traditionally applied for weight-loss purposes. Increased health awareness, the needs for a balanced diet and weight control have also led consumers to complement their diet with dietary supplements (Statista, 2018).

#### **4.2 Consumer preferences on ingredients of healthy sweet snacks**

The health related claim (or appeal) of a food product induces greater visibility and marketing appeal to that product. Although the use of the term “healthy” is not yet fully elucidated, it is important to understand how consumers define, perceive and understand such

products, as well as their desires for them, so that their demands are met by the food industry (Lusk, 2019a). In addition, exploring the mediating effect of individual aspects (e.g., concern with body image, health care, among others) on the consumer perception and preferences helps the market design for those products (Pinto et al., 2021).

In relation to the survey consumer preferences, a large portion of consumers in the survey, with no difference among all three segments, stated that they prefer natural ingredients in healthy sweet snacks (48,5%), while they reject, more often, products with additives (30,1%) or too many ingredients (28,8). These consumers represented 48.5% of the total study population.

Consumer perceptions of naturalness have become increasingly important for the acceptance and consumption of food and food technologies (Román et al., 2017; Migliore et al., 2018). In previous studies, it was shown that the natural claim in food labels influences consumer choice and that consumers are willing to pay more for those products with natural labels (Asioli et al. 2017, Lusk 2019b). Moreover, despite perceptions on “healthy food” are individual and subjective, for most consumers, the naturalness of food is a crucial factor, hence it cannot be neglected (Román et al., 2017; Pinto et al., 2021; Monterrosa et al., 2020; Lusk 2019ab).

The properties of the final product, such as the presence or absence of food additives, also are important aspects in this perception of naturalness. In a recent study, “Preservative-free” was the most common term associated with this type of food when consumers were asked what it means for a food to be called natural (Lusk, 2019b). In this context, benzoates, nitrites and sulfites are examples of additives considered by most consumers to be unnatural (Lusk, 2019b). In other words, for consumers, foods with natural claims must be free of artificial additives or chemicals (Euromonitor International, 2016; (Román et al., 2017; Lusk, 2019b).

The food industry is responding to this trend with the use of the “clean label”, which emphasizes the simple listing of ingredients and the absence of chemical additives or unnecessary ingredients (Asioli et al., 2017; Román, et al., 2017). Clean label labels, in a more detailed approach, can also be positioned as “natural”, “organic” and/or “free from additives/preservatives” products (Asioli et al., 2017).

Another type of ingredient that stood out as preferred for healthy sweet snacks, besides "natural", was "organic", chosen by 22.2% of the consumers in the study (located mainly at clusters A and B). In this regard, authors point out that natural and organic foods have steadily grown in sales in recent decades, both are often referred to almost interchangeably or presented together as one market segment (Gifford and Bernard 2011; Lusk, 2019a). It is known that consumer preference for organic products has grown substantially due to the growing interest in health and its relationship to diet (D'Amico et al., 2016). Therefore, an increased concern for health conditions and a healthy lifestyle are factors that make the consumer attitudes more positive towards organic foods (Chen, 2007; Martins et al., 2019).

It is worth mentioning that "protein" ingredients were chosen as preferred by 12.4% of the population, these being more present in group C (more physically active consumers). This result reinforces, as previously discussed, the potential of using protein food supplements/ingredients, such as whey protein, in these products directed to this segment.

As for preferred ingredients to sweeten healthy sweets, 54.9% of the study population preferred sugars in general (unspecified). These consumers were more significantly present in groups A and B, than in C. This high preference by the majority shows that general sugars are still high potential ingredients for these products.

It should be noted that 32.5% of consumers preferred natural sugar substitutes as sweeteners, while artificial sugar substitutes had a very low preference (6.9%). These results, added to the high preference of the population (48.5%) for natural ingredients, consolidate the strong market trend towards natural products reduced in sugars or sugar-free (Román et al., 2017; Migliore et al., 2018; Souza, 2022). Based on this information, natural sweeteners show great potential for sweetening healthy sweet snacks.

It is noticeable that consumers are gradually becoming more interested in the naturalness of foods, which has been directly reflected in the increased demand for and use of natural sweeteners (Carocho, Morales & Ferreira et al., 2017; Mooradian et al., 2017; Saraiva et al., 2020). Sugar substitutes sweeteners are substances that, although they impart a sweet taste to food, are chemically different from sucrose (Nabors, 2002). They are substances that have been

used to provide a sweet taste with fewer or no kilojoules and/or carbohydrates/sugar added to the diet (Nabors, 2002; Carochó et al., 2017).

Despite these many benefits associated with the use of natural sugar substitutes and their potential uses in healthy sweets snacks, it is worth noting that the majority of consumers in the survey still prefer sugars to sweeteners. We believe this is likely due to the significant rejection of food additives by a large proportion of consumers (30.1%).

Finally, word clouds obtained from the responses more frequent for the preferred ingredients and sweeteners illustrated very well the concept of a “healthy sweet ideal snack” for each consumer segment (Figure 1). In short, the word clouds corroborate the information discussed so far clearly showing the potential of healthy sweet snacks made primarily with natural ingredients, preferably also made with few ingredients and no additives.

It is also worth mentioning that the use of organic ingredients, mainly for groups A and B, and of natural sweeteners, mainly for groups A and C, also revealed their potential for use in those products. Therefore, these ingredients also should be considered in the development of healthy sweet snacks by the food industry.

## **5. Final considerations**

According to consumers' food choice motivations, such as "quality of life", "weight", and "aesthetics", and their self-perceptions regarding diet, physical activity, weight, and body composition, three consumer groups were identified.

The consumers in cluster B, the largest consumer group in the study, were the most motivated by the “quality of life” factor, i.e., they are individuals who tended to choose foods that collaborate with disease prevention, longevity and health improvement. Consumers in cluster A and C were more motivated by the “Weight” and “Aesthetics” factors, respectively. Thus, these are the most relevant factors for this niche market, consisting mainly of adult women.

All three groups showed that they prefer healthy sweet snacks made with natural ingredients, while they reject, more often, products with additives or too many ingredients.

Organic ingredients, mainly for clusters A and B, natural sweeteners, mainly for clusters A and C, and protein ingredients, mainly for cluster C, were also frequently chosen for the formulation of those products.

In this way, it can be concluded that healthy sweet snacks made ideally with natural ingredients, and preferably with few ingredients and no additives, i. e. following the trend of “clean label” products, are a promising response from manufacturers to a growing consumer demand for a more practical, healthy, and natural diet. Products made with organic and/or protein ingredients and sweetened with natural sweeteners also showed potential to be exploited by the food industry, depending on the group of consumers to be reached.

In this study, information on preferences of health and well-being-oriented consumers for sweet healthy snacks were consolidated, which we hope will stimulate progress in this sector. This study can directly benefit both consumers and the food industry, since manufacturers' sales and profits can be increased by offering products that assertively meet the specific demands of these consumers.

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### **Author contributions**

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### **Declaration of competing interest**

The authors declare no conflict of interest

### **Data availability**

The lead and correspondent author has full access to the data reported in the manuscript, who can provide full access to the data to anyone upon request.

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