

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
FACULDADE DE ODONTOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA
MESTRADO EM ODONTOLOGIA
ÁREA DE CONCENTRAÇÃO CLÍNICA ODONTOLÓGICA - ODONTOPEDIATRIA

ANÁLISE DE INTERESSE DOS USUÁRIOS DO GOOGLE EM INFORMAÇÕES SOBRE
CHUPETA: UM ESTUDO ECOLÓGICO DIGITAL

EMÍLIA LOBATO HAGEMANN

ORIENTADOR: DR. JONAS DE ALMEIDA RODRIGUES

Porto Alegre

2022

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
FACULDADE DE ODONTOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA
MESTRADO EM ODONTOLOGIA
ÁREA DE CONCENTRAÇÃO CLÍNICA ODONTOLÓGICA - ODONTOPEDIATRIA

ANÁLISE DE INTERESSE DOS USUÁRIOS DO GOOGLE EM INFORMAÇÕES SOBRE
CHUPETA: UM ESTUDO ECOLÓGICO DIGITAL

Dissertação submetida ao Programa de Pós-graduação em Odontologia da Universidade Federal do Rio Grande do Sul, como requisito obrigatório para obtenção do título de Mestre em Clínica Odontológica/Odontopediatria.

EMÍLIA LOBATO HAGEMANN

ORIENTADOR: PROF. DR. JONAS DE ALMEIDA RODRIGUES

Porto Alegre

2022

CIP - Catalogação na Publicação

Hagemann, Emilia Lobato
Análise de interesse dos usuários do Google em
informações sobre chupeta: um estudo ecológico digital
/ Emilia Lobato Hagemann. -- 2022.
44 f.
Orientador: Jonas de Almeida Rodrigues.

Dissertação (Mestrado) -- Universidade Federal do
Rio Grande do Sul, Faculdade de Odontologia, Programa
de Pós-Graduação em Odontologia, Porto Alegre, BR-RS,
2022.

1. chupeta. 2. informação de saúde online. 3.
educação em saúde. 4. crenças. 5. hábitos de saúde.
I. Rodrigues, Jonas de Almeida, orient. II. Título.

AGRADECIMENTOS

Aos meus pais, **Andre Hagemann** e **Marina Hagemann**, pelo exemplo e pela importância que sempre deram ao estudo e à educação, além do incansável incentivo e apoio em todas as minhas decisões. Obrigada por estarem sempre presentes e não medirem esforços para me proporcionar o melhor.

À minha irmã, **Corina Hagemann**, pela paciência e ajuda na fase final da escrita desse trabalho. Obrigada por ler e me ajudar a escrever mesmo sem saber nada de Odontologia.

Ao meu marido, **Guilherme Pretto**, pelo apoio, amor e paciência para me ouvir tantas vezes e abrir mão de algumas coisas para poder concluir esse projeto.

Ao meu orientador **Prof. Dr. Jonas de Almeida Rodrigues** por me apoiar desde a época da graduação e ser um exemplo de profissional e pessoa, sempre disposto a ajudar e contribuir para minha evolução e crescimento.

RESUMO

A sucção de chupeta é um hábito não nutritivo muito comum durante o primeiro ano de vida, mas sua indicação ainda é controversa, e muitos pais utilizam as informações de busca na Internet para elucidar suas dúvidas sobre a chupeta e seus efeitos. O objetivo deste estudo foi determinar as tendências dos usuários do Google de diferentes países na busca de conteúdo na Web sobre chupetas ao longo dos anos, elucidando a influência do COVID-19 neste comportamento de busca de informações de saúde online. Este estudo digital ecológico retrospectivo longitudinal avaliou os metadados computacionais relacionados à chupeta de 22 países usando a plataforma Google Trends entre janeiro de 2004 e maio de 2021. Os países avaliados foram selecionados de acordo com três critérios: pelo menos 10 milhões de habitantes, mais de 70% de penetração da Internet e dados disponíveis suficientes no Google Trends; e o termo de busca utilizado na ferramenta foi “pacifier”. O volume relativo de buscas (RSV) e as principais consultas realizadas pelos usuários foram analisados quantitativa e qualitativamente. Valores de $p < 0.05$ foram considerados significativos. Em geral, as curvas do RSV caracterizaram-se por tendências de alta na maioria dos países estudados ao longo dos anos, sem influência da sazonalidade mensal ou trimestral. As consultas foram frequentemente associadas ao desejo de informações adicionais sobre os diferentes tipos de chupetas e como retirá-las e confeccioná-las. Esses achados indicam um interesse crescente dos usuários do Google em tópicos relacionados à chupeta em diferentes países e a pandemia de COVID-19 acentuou esse hábito em 5 países observados: Austrália, Canadá, França, Japão e Romênia.

Palavras-chave: chupeta, crenças, educação em saúde, informação de saúde online, hábitos de saúde

ABSTRACT

Pacifier sucking is a very common non-nutritive habit during the first year of life, but its recommendation is still controversial, and many parents use the internet search information to elucidate their doubts about pacifier and its effects. The aim of this study was to determinate the trends of Google users from different countries in searching Web content about pacifiers over the years, elucidating the influence of COVID-19 on this online health information seeking behavior. This longitudinal retrospective ecological digital study evaluated the pacifier-related computational metadata from 22 countries using the Google Trends platform between January 2004 and May 2021. The evaluated countries were selected according to three criteria: at least 10 million inhabitants, more than 70% Internet penetration and sufficient data available on Google Trends; and the search term used in the tool was “pacifier”. The relative search volume (RSV) and the main queries performed by users were analyzed quantitatively and qualitatively. P values < 0.05 were considered significant. In general, RSV curves were characterized by uptrends in most studied countries over the years, without the influence of monthly or quarterly seasonality. The queries were frequently associated with a desire for additional information with respect to different types of pacifiers and how to remove and make them. These findings indicate an increasing interest of Google users in pacifier-related topics in different countries and the COVID-19 pandemic accentuated this habit in 5 observed countries: Australia, Canada, France, Japan, and Romania.

Key words: pacifier, beliefs, health education, online health information, health habits

SUMÁRIO

1. INTRODUÇÃO.....	7
2. OBJETIVO.....	11
3. ARTIGO.....	12
4. CONSIDERAÇÕES FINAIS.....	40
REFERÊNCIAS.....	41

1. INTRODUÇÃO

A sucção de chupeta é um hábito não-nutritivo muito comum e aceito durante o primeiro ano de vida, pois diminui o risco da síndrome da morte súbita infantil, devido às suas influências no controle autonômico e cardiovascular e ajuda a acalmar as crianças além de favorecer seu desenvolvimento psicológico. (17) Os hábitos de sucção não nutritivos referem-se à prática de sucção para outros fins que não a nutrição e podem ser considerados o primeiro passo no desenvolvimento capacidade de controlar as emoções (14,15). O reflexo de sucção é adquirido ainda no útero entre a oitava e a décima oitava semana de gestação. Após a vigésima oitava semana, a função de sucção torna-se mais complexa, especialmente com o desenvolvimento do ciclo essencial de sucção-deglutição, que continua a evoluir até o nascimento. Esse instinto natural leva os bebês a sugarem seus dedos até mesmo durante o período gestacional. (14,16)

No entanto, sabe-se que esses hábitos de sucção não-nutritivos podem ser também deletérios, uma vez que padrões de contração muscular aprendidos e repetidos frequentemente acarretam danos à morfofisiologia do sistema estomatognático e às estruturas ósseas, como também às funções orofaciais e são fatores de risco para a respiração oral e para alterações na função mastigatória e de deglutição. Sabe-se que a gravidade dessas alterações está diretamente relacionada à frequência, duração e intensidade do hábito, bem como à predisposição individual, condicionada pelos fatores genéticos. (8,3,9,10,17,18) A fim de minimizar esses problemas, foram desenvolvidas chupetas e mamadeiras ortodônticas, porém, não são nítidas as diferenças da repercussão entre o uso de bicos de chupeta/mamadeira ortodônticos em comparação aos convencionais. (8)

O uso de chupeta mesmo em países desenvolvidos está tão estabelecido culturalmente que a prevalência chega a 42.5% em crianças até os 12 meses de idade. (3) A chupeta é muito utilizada pelos pais e responsáveis com o intuito de acalmar os bebês e também ganhou popularidade pois esse hábito evita a instalação da sucção digital. Sabe-se que a sucção de chupeta seguida da sucção digital são os hábitos nocivos mais comuns na infância, principalmente na faixa etária de 0 a 3 anos, devido ao processo de desenvolvimento e descoberta do mundo (4). Além disso, o início do uso precoce de chupeta ortodôntica (0 a 3 meses) parece estar associado a um risco reduzido de desenvolver o hábito de sucção do dedo e/ou polegar (17). Duncan et al. (2008), coletaram dados de hábitos não nutritivos em crianças aos 15, 24 e 36 meses de idade e constataram que aos 15

meses 63.2% das crianças tinham o hábito de sucção não-nutritivo, sendo que 37.6% usavam apenas chupeta e 22.8%, sucção digital. Já aos 36 meses, esse hábito havia reduzido para 40%, com prevalência semelhante para sucção de chupeta e sucção digital. (13)

Mas há outros riscos potenciais do uso das chupetas. Sendo a principal preocupação a redução de amamentação, a Academia Americana de Pediatria recomenda o uso de chupeta somente após o estabelecimento da amamentação. No entanto, Kair et al. (2013) em um estudo comparando recém-nascidos que receberam chupetas no hospital com bebês que foram restringidos de chupetas, encontraram uma taxa significativamente maior (79%) de aleitamento materno exclusivo no primeiro grupo do que no segundo (68%). Além disso, Jaafar et al. (2016) atualizaram uma revisão da Cochrane com dois ensaios clínicos controlados e mostraram que o uso de chupeta em lactentes saudáveis, iniciado ao nascimento ou após o estabelecimento da lactação, não afetou significativamente a prevalência ou a duração do aleitamento materno exclusivo e parcial até os 4 meses de idade. Já em uma revisão sistemática com metanálise, Buccini et al. (2017) encontraram uma associação positiva entre o uso de chupeta e interrupção do aleitamento materno exclusivo em 44 estudos observacionais, e nenhuma associação nos dois ensaios controlados randomizados. Dessa forma, com base em seus achados em estudos observacionais, apoiaram a recomendação original da OMS. (21,22,23,24)

Outro estudo prévio investigou a influência da sucção do dedo e do uso de chupeta nos padrões de aleitamento materno em lactentes exclusivamente amamentados, na duração da amamentação exclusiva e na duração total da amamentação. Os autores concluíram que a sucção de dedo claramente não estava relacionada aos efeitos negativos sobre o padrão e a duração da amamentação. Enquanto os possíveis efeitos negativos do uso de chupeta no padrão e duração da amamentação foram relacionados à frequência e seu uso ocasional não teve efeito negativo sobre a duração da amamentação. (20) Um estudo qualitativo com 23 mães mostrou que embora muitas delas percebam benefícios no uso da chupeta, outras estão retardando seu uso ou estão cautelosas quanto a sua implementação devido a preocupações com os efeitos potenciais sobre a amamentação, dependência de chupeta ao longo prazo e efeitos sobre a dentição. (21)

No entanto, a chupeta não preocupa apenas por esses motivos já citados acima, mas também pela associação do seu uso com o QI das crianças e maiores riscos de infecções de ouvido. Giugliani et al. (2021) encontraram forte associação entre uso intenso de chupeta até os 4

anos de idade e QI mais baixo aos 6 anos, enquanto Peixoto et al. (2020) relacionaram o uso de chupeta com maior risco de infecções de ouvido nas crianças.

Diante dessas informações ainda inconsistentes em relação ao uso da chupeta e com a chegada da pandemia do COVID-19, torna-se interessante saber o quanto as pessoas buscam por esse assunto na Internet ao longo dos anos e se o volume dessas buscas sofreu alteração com esse novo estilo de vida imposto às pressas. Desde o início de 2020, os pais se viram diante de uma nova realidade: trabalhar em casa com a presença dos filhos. E, para permitir a conciliação da rotina de trabalho com a da família, eles podem ter buscado informações na Internet sobre chupeta, já que a busca por informações de saúde online é uma realidade atualmente. Muitos indivíduos inclusive assumem a responsabilidade por sua própria saúde e os médicos não são mais os detentores de conhecimentos. (1)

As tecnologias da informação e comunicação estão evoluindo e se disseminando pelo mundo, com atenção especial à Internet, que está sendo usada globalmente por milhões de pessoas diariamente para encontrar informações sobre saúde e se tornando um recurso complementar de informação nesse tópico. A análise de tendências e padrões coletivos na busca de informações sobre condições médicas e de saúde ajudou a fornecer percepções sobre as necessidades de informação no nível da população. Para buscar entender esse comportamento digital surgiu então, a área interdisciplinar da “infodemiologia” para avaliar cientificamente a distribuição e os determinantes da informação em mídia eletrônica, com foco principal na Internet. Mas tem sido considerado o objetivo final dos estudos infoedemiológicos informar a saúde pública e as políticas públicas. (1,11,25)

Junto com a abordagem infoedemiológica, a análise de consultas de motores de busca para lançar luz sobre o status de várias doenças e a análise de comportamentos de busca de informações de saúde das pessoas ganharam popularidade crescente, especialmente durante os últimos 4-5 anos. (11) Novas ferramentas estão surgindo para facilitar a pesquisa em saúde (6) e o crescente domínio dos mecanismos de pesquisa do Google como interface principal de pesquisa significa que os índices e outras ferramentas de design de sites podem estar perdendo importância. (2)

Uma ferramenta que permite aos usuários interagir com os dados de pesquisa da Internet é o Google Trends, um portal online gratuito e publicamente acessível do Google Inc. O Google Trends analisa uma parte dos três bilhões de pesquisas diárias da Pesquisa Google e fornece dados sobre padrões geoespaciais e temporais em volumes de pesquisa para termos especificados pelo

usuário. Por isso, seus dados vem sendo muito utilizados ultimamente para analisar os padrões de comportamento da população na Internet. (6)

Na Odontologia, existem estudos infodemiológicos avaliando interesse nas buscas na internet por termos odontológicos como dor de dente (39,40,12,42,43), cárie dentária (43,12), hipomineralização de molares e incisivos (46, 47) e colar de ambar (48) para aliviar sintomas da erupção dos dentes decíduos. No entanto nenhum estudo avaliou o interesse nas buscas por chupeta apesar do seu uso ser bem disseminado e existirem problemas dentários e esqueléticos relacionados a esse hábito.

2. OBJETIVO

Devido às diferentes informações sobre o uso de chupeta em bebês e a grande mudança no estilo de vida nos últimos dois anos devido a pandemia do COVID-19 os objetivos do presente estudo foram analisar os dados de buscas sobre o tema “chupeta” na ferramenta Google Trends e o padrão de comportamento dos usuários que se interessam por esse assunto ao longo dos anos em diferentes países do mundo, elucidando a influência do COVID-19 nesse comportamento de busca online de informações de saúde. Uma vez que o aumento do uso da chupeta pode impactar no futuro em maiores problemas de oclusão em crianças e dificuldade em interromper esse hábito, por exemplo; se os profissionais de saúde já tiverem conhecimento dessa informação, poderão estar melhor preparados para atender esses pacientes e orientar os pais ou responsáveis. Além disso, como há uma deficiência na comunicação entre pacientes e profissionais, e isso motiva a busca por informações de saúde na internet, as autoridades de saúde poderiam monitorar melhor essas informações disponíveis para garantir a sua qualidade, enquanto os profissionais de saúde deveriam tentar dar mais atenção às queixas dos seus pacientes e procurar esclarecer todas as suas dúvidas.

3. ARTIGO

Essa dissertação de mestrado se apresenta na forma de um artigo escrito na língua inglesa.

Analysis of Google users' interests in information about pacifiers: an ecological digital study
Hagemann EL¹, Cruvinel T², Hoffelder LB¹, Petersen RC¹, Lotto M², Aguirre PEA², Rodrigues JA¹

¹School of Dentistry, Federal University of Rio Grande do Sul, UFRGS

²Bauru School of Dentistry, University of São Paulo, USP.

Abstract

Background: Pacifier sucking is a very common non-nutritive habit during the first year of life, but this recommendation is still controversial, and many parents use the internet search information to elucidate their doubts about pacifier and its effects.

Aim: To determinate the trends of Google users from different countries in searching Web content about pacifiers over the years, elucidating the influence of COVID-19 on this online health information seeking behavior.

Methods: This longitudinal retrospective ecological digital study evaluated the pacifier-related computational metadata from 22 countries using the Google Trends platform between January 2004 and May 2021. The relative search volume (RSV) and the main queries performed by users were analyzed quantitatively and qualitatively. P values < 0.05 were considered significant.

Results: In general, RSV curves were characterized by uptrends in most studied countries over the years, without the influence of monthly or quarterly seasonality. The queries were frequently associated with a desire for additional information with respect to different types of pacifiers and how to remove and make them.

Conclusions: These findings indicate an increasing interest of Google users in pacifier-related topics in different countries and the COVID-19 pandemic accentuated this habit in 5 observed countries: Australia, Canada, France, Japan, and Romania.

Key words: pacifier, beliefs, health education, online health information, health habits

Introduction

Pacifier sucking is a very common and accepted non-nutritive habit during the first year of life, as it decreases the risk of sudden infant death syndrome because its influences on autonomic and cardiovascular control and helps to calm children and improve their psychological development. (17) Sucking habits are associate with non-nutritive purposes being considered the first step in the child development of self-regulation and ability to control emotions. (14, 15) However, these habits can be deleterious because the learnt and repeated muscle contraction

patterns that often cause damage to the morphophysiology and functions of the stomatognathic system and bone structures. It is noteworthy that they are risk factors for the development of oral breathing and changes in masticatory and swallowing functions. The severity of the alterations is directly related to the frequency, duration, and intensity of the habits, depending on the individual predisposition conditioned by genetic factors. (8,3,9,10,17,18)

There are other potential risks of using pacifiers, such as the reduction of breastfeeding (22); however, this association is supported by controversial outcomes. The findings of a Cochrane systematic review showed that the use of pacifier by healthy infants did not significantly affect the prevalence or duration of exclusive and partial breastfeeding until 4 months of age, independently whether the habit started at birth or after lactation (24). The highest level of evidence does not support an adverse relationship between pacifier use and breastfeeding duration or exclusivity. The association between shortened duration of breastfeeding and pacifier reflects several other complex factors, such as breastfeeding difficulties or intent to wean (35). In contrast, a meta-analysis of observational studies found a positive association between the use of pacifier and the interruption of exclusive breastfeeding, although it was not confirmed by the analysis of two randomized controlled trials in the same study (23). Besides that, there is a cultural behavior in which pacifier use is widely regarded as a positive habit and that mothers often strongly stimulated the infants to accept it. Although few mothers openly admitted that pacifiers might shorten breastfeeding, a considerable number of them effectively use pacifiers to get their infants off the breast or to increase the interval between feedings (36,30,28). In this sense, the American Academy of Pediatrics recommends the use of pacifiers, but only after the establishment of breastfeeding (21), although evidence to assess the short-term breastfeeding difficulties faced by mothers and long-term effect of pacifiers on infants' health is lacking (24). Also, in the late 1980s, the World Health Organization and UNICEF adopted avoidance of pacifiers as one of the Ten Steps of Successful Breastfeeding and the Step 9 states: "Give no artificial teats or pacifiers to breastfeeding infants" (53). Many studies on sudden infant death syndrome, however, point to the pacifier as a protective factor, so the American Academy of Pediatrics guidelines recommend the use of the pacifier in infants at bedtime to reduce the risk of sudden infant death syndrome (SIDS). (52, 57, 30).

Information and communication technologies (ICTs) are evolving and spreading worldwide by the Internet, containing health information that can be almost ubiquitously accessed

billions of users daily, through the application of search engine tools as Google Search (6). The search activity of Google users generates Big Data that can be compiled and analyzed by Google Trends, a free and publicly accessible online portal from Google Inc. It provides data about geospatial and time patterns in search volumes for user-specified terms, i.e., it is quite helpful to make researchers conscious of the patterns of population digital behaviors. Therefore, not surprisingly, some infodemiological studies have already evaluated the interests of people about dental topics, such as toothache (39,40,12,42,43), dental caries (43,12), early childhood caries (45), molar incisor hypomineralization (46,47), and amber necklace (48). However, to the best of our knowledge, there are no studies that elucidate the volume of Web searches on pacifier, although its widespread use and negative biological consequences.

Indeed, there has been a shift in the role of the patient from passive recipient to active consumer of health information and the most common reason is sheer curiosity (37,38). However, the motivation to individuals with a higher education is due to a lack of enough information from their doctors (38). Thus, it would be interesting to know the interest of Internet users about sucking habits over the years, measuring the effect of the new lifestyle imposed by COVID-19 pandemic, characterized by the homework and more time for and with family. Hypothetically, parents and caregivers probably may have sought digital information to calm their children in working time, e.g. to avoid unexpected interruptions during online meetings.

Regarding distinct recommendations of dental associations about the use of pacifiers by babies, and the great lifestyle changes observed after the onset of COVID-19 pandemic, the aims of this study were to determine the trends of Google users from different countries in searching Web content about pacifiers over the years, elucidating the influence of COVID-19 on this online health information seeking behavior. Once an increase in the pacifiers' use can impact hereafter on higher occlusion problems in children and difficulty in stopping this habit, for example, if the health professionals are already aware of this information, they can be better prepared to treat these patients and guide parents or relatives. In addition, since there is a deficiency in communication between patients and professionals, and this motivates the search for health information on the Internet by them, health authorities could better monitor this available information to guarantee their quality while health professionals should try to pay more attention to their patients' complaints and seek clarify all your doubts.

Materials and methods

Ethics

Since federal regulations consider that research using publicly available data does not involve human subjects, the present study does not require institutional review board approval from the *blinded to peer review*.

Study design

This longitudinal retrospective ecological digital study evaluated the pacifier-related computational metadata from 22 countries using the Google Trends platform, as previously described by Cruvinel et al. (2019), Lotto et al. (2019), Strieder et al. (2019), Aguirre et al. (2020), Rizzato et al. (2021). The relative search volume (RSV) and the main queries performed by users were analyzed quantitatively and qualitatively.

Countries selection

The countries were selected according to (a) at least 10 million inhabitants (61) more than 70% of Internet penetration in 2021 (27), and (c) the sufficiency of data available on Google Trends. Thus, a total of 22 countries were included in the analyses: Argentina (ARG), Australia (AUS), Belgium (BEL), Brazil (BRA), Canada (CAN), Chile (CHL), France (FRA), Germany (GER), Indonesia (IDN), Italy (ITA), Japan (JPN), Mexico (MEX), Netherlands (NLD), Poland (POL), Romania (ROM), Saudi Arabia (SAU), Spain (ESP), Taiwan (TWN), Turkey (TUR), United Kingdom (UK), United States (USA), and Venezuela (VEN).

Relative Search Volume (RSV)

The RSV is calculated regarding the proportion of a specific query in relation to all queries performed by Google users on a weekly or monthly basis, normalized by the maximum value found in a determined period ($RSV = 100$).

The metadata can be filtered by period, source, location, and category. On May 25, 2021, the relative search volume (RSV) and the main queries performed by users were obtained by the application of the following parameters: i) query: Pacifier (Topic), ii) timeframe: from January 2004 (first available data from Google Trends) to May 2021, and iii) categories and sources: all categories and sources. The function "topic" represents an automatic algorithm developed by Google Trends to summarize all queries related to an issue of interest.

Top queries

Google Trends also provides a list of the most popular queries used in each country to find information associated with the topic of interest over time. In this sense, the main queries were collected and translated into English, to characterize the specific interests of users and all non-related dental queries were excluded from the original list.

Data Analysis

The metadata were analyzed with the Statistical Package for Social Science (version 21.0; SPSS, Chicago, USA), as described below:

- (i) Trends: the trends of time series for each country were analyzed by the autocorrelation (ACF) and partial autocorrelation (PACF) plots. Also, the curves originated from autoregressive integrated moving average (ARIMA) models were heuristically analyzed to observe their variations over time.
- (ii) Seasonality: generalized additive models (GAM) were used to evaluate the influence of seasonality, with a previous detrending of each long-term curve by its lag-1 difference and subsequent application of generalized linear models, to evaluate the effect of monthly and quarterly seasonality on time series.
- (iii) Forecasting models: 12-month forecasts of RSV values for pacifier were constructed by ARIMA models, which were chosen by the lowest values of normalized Bayesian information criteria (Normalized BIC).
- (iv) Analysis of the influence of COVID-19: The monthly percentage variations of RSV values from 2018 to 2019, and from 2019 to 2020 were compared according to the normality and

homogeneity of data (Shapiro-Wilk and Levene tests), as follows: t-Student test (ARG, AUS, BEL, CAN, CHL, GER, IDN, ITA, JPN, MEX, NLD, POL, SPN, TUR, UK, USA and VEN), and Mann-Whitney U test (BRA, FRA, ROM, SAU and TWN).

For all analyses, P values < 0.05 were considered statistically significant.

Results

Search volume trends

The analysis of ACF and PACF did not demonstrate clear trends of curves for any country, but the heuristic analysis of time series denoted a general increase of the interests in pacifier-related information since 2004. There were noted 3 groups of RSV curves: 1) linear increase of RSV values over time (USA, MEX, FRA, UK, POL, SAU, CAN, BEL and AUS), 2) sigmoid curve (TWN, TUR, ITA, JPN, SPN, ARG, BRA, and GER), 3) without defined pattern (CHL, IDN, ROM, NLD and VEN) (Figure 1).

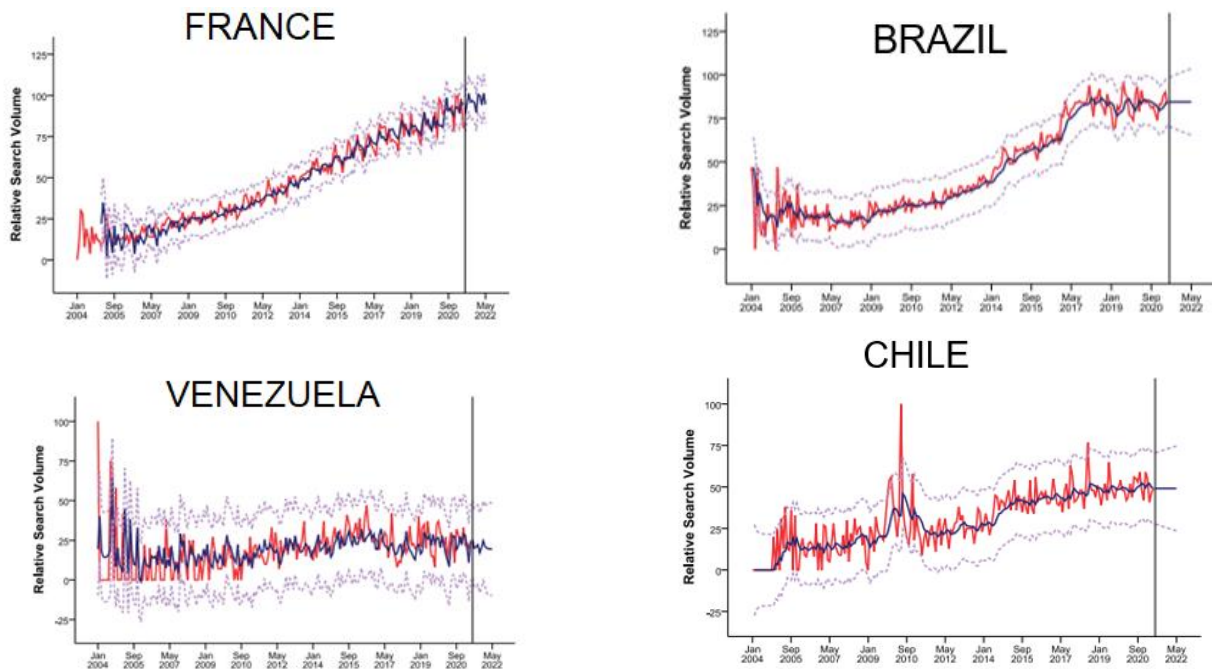


Figure 1. Predictive charts for pacifier-related interests of Google users from France, Turkey, Venezuela and Chile. The curves of observed values (red lines), fit and forecast values (blue lines), and upper and lower bound of confidence intervals (violet lines) are depicted from January 2004 through May 2021. Note that RSV values presented after May 2021 (black line) represent 12-month predictive values.

Seasonality

The variation of means of monthly detrended RSV values is represented in a heat map (Figure 2). According to GAM analysis, the results did not show significant effect of monthly or quarterly seasonality on the interests of Google users.

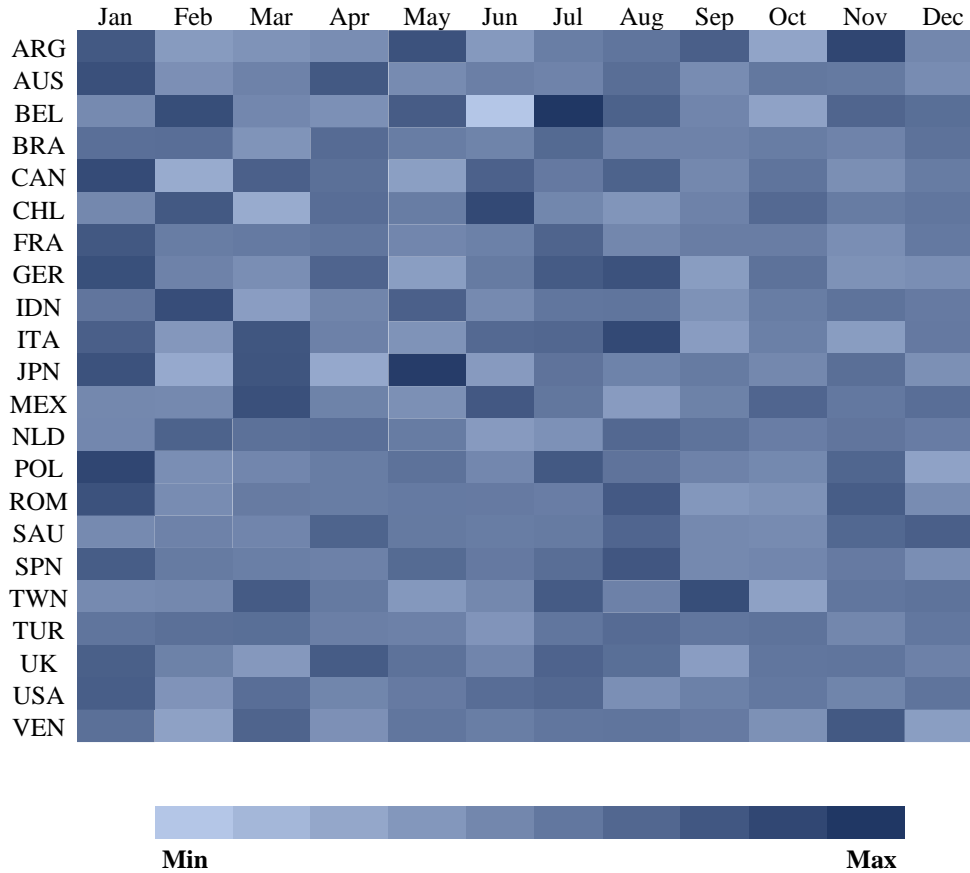


Figure 2. Heat map of monthly variation of predictive GAM values for pacifier in different countries. The seasonality was estimated by fitting a generalized additive model (GAM) to detrended Google Trends data (lag-1 difference).

Covid-19

A list of the 22 countries with data pre and pos COVID-19 pandemic is showed in Table 2. It was observed an increase in pacifier-related search since 2004 in all of them. Although, one third had significative growth on pacifier-related search: AUS ($p=0.028$), CAN ($p=0.003$), FRA

($p=0.001$), JPN ($p=0.002$) and ROM ($p=0.036$). From the five countries with rising searches four of them are developed countries and Romania is in development.

Country	Pre COVID-19		Pos COVID-19		p
	Mean	Std deviation	Mean	Std deviation	
Argentina	79.17	6.37	78.58	9.28	0.859
Australia ^a	9.33		15.67		0.028 ^A
Belgium	9.22	2.66	12.50	3.61	0.142
Brazil ^a	12.79		12.21		0.840
Canada	71.58	9.32	83.33	7.50	0.003 ^A
Chile	49.25	6.28	50.67	6.58	0.595
France	79.42	4.98	90.17	7.41	0.001 ^A
Germany	90.75	5.94	88.67	6.24	0.411
Indonesia	37.08	3.63	39.83	4.22	0.101
Italy	74.67	8.46	73.17	7.60	0.652
Japan	70.25	4.25	76.58	4.68	0.002 ^A
Mexico	69.33	6.29	73.83	7.02	0.112
Netherlands	51.08	6.24	45.58	9.77	0.115
Poland	80.25	11.32	80.00	6.97	0.949
Romania ^a	9.58		15.42		0.043 ^A
Saudi Arabia	75.00	10.64	83.00	16.57	0.173
Spain	75.67	5.19	80.08	7.18	0.098
Taiwan ^a	12.42		12.58		0.954
Turkey	90.08	5.82	90.33	5.68	0.916
United Kingdom	87.67	5.60	85.58	8.02	0.469
United States	83.75	5.99	86.75	5.46	0.213
Venezuela	24.92	9.32	24.00	6.76	0.785

Table 1. Pacifier-related search before and after COVID-19 pandemic. Independent Samples Test.

^a Mann-Whitney Test

^A Upper superscript letters indicate significant statistical differences.

Most popular queries

The list of most popular queries employed in each country is showed in Table 1. The Google users from BRA, CAN, FRA, GER, IDN, JPN, MEX, NLD, SAU, SPN, TUR, VEN, and USA usually searched the term “pacifier” associated with the word ‘baby’, while AUS and UK users preferred the word ‘dummy’. In developing countries as BRA, ARG and VEN the query

‘how to make a pacifier’ is found among searches. Also, there is a concern about ‘how to erase’, ‘leave’, ‘quit’ and ‘remove’ pacifiers among Google users from ARG, CHL, ITA, MEX, TWN and VEN. However, the only country where the users were interested in the relation between pacifier and breastfeeding was USA. The users from JPN, ITA, ROM, MEX and USA were worried about the relationship between pacifier and ‘teeth’, ‘dentition’ or ‘orthodontic pacifier’.

Table 2. Pacifier-related queries and their respective RSV for each country.

Argentina		<i>Queries</i>		<i>RSV</i>		Brazil	
		Australia		Belgium			
Pacifier	100	Dummy	100	Pacifier	100	Pacifier	100
Pacifiers	51	Dummies	50	Pacifier	63	Pacifier	14
Pacifier	44	Pacifier	42	Nipple	32	Baby pacifier	10
The pacifier	20	Baby dummy	40	Avent	23	Avent	8
Avent	13	Baby dummies	13	Bibi	20	Make pacifier	7
How to get a pacifier	12	Bibs	11	Difrax	17	Avent pacifier	7
Avent pacifiers	8	Baby pacifier	10	Bibs	15	How to make pacifier	5
How to make a pacifier	8	Bibs dummies	10	Bibi pacifier	14	Baby pacifier	5
Baby shower	4	Newborn dummy	9	Pacifier	13	Mam	5
Pacifier holder	3	Pacifiers	8	Pacifier with name	13	Mam pacifier	4

Pacifier on the neck	3	Nuk	7	Bibs pacifier	12	Car pacifier	4
Newborn pacifier	3	Avent	6	Pacifier clip	10	Pacifier	4
Pacifiers for baby shower	3	Dummy clips	6	Avent pacifier	9	Baby bottle	4
Pacifier	3	Dummy clip	5	Pacifier	7	Pacifier for baby	4
Baby with pacifier	3	Tomme tippee	5	My pacifier	6	Pacifier holder	3
Pacifier images	2	Nuk dummies	5	Persolanized pacifier	6	Silicone pacifier	3
Fixed gear	2	Dummies for babies	4	Suavinex	6	Nuk	3
Pacifier for fruit	2	Avent dummies	4	Suavinex pacifier	6	Battery pacifier	3
Leave the pacifier	2	Gumdrop	3	Dreambaby	5	Handle pacifier	3
Pacifier fixed sprocket	2	Dummy chain	3	Persolanized pacifier	3	Pacifier clip	3
How to erase a pacifier	2	Happy baby dummy	3	Pacifier	3	Nuk pacifier	2
Pacifiers for babies	2	Baby bunting	3	Pacifier mom	3	Silicone pacifier	2
Cartoon pacifiers	2	Tomme tippee dummy	3	Pacifier bibs	3	Newborn pacifier	2
Pacifier holder	2	Dummy for newborn	3			Pacifier nipple	2

Pacifier drawing	2	Cherry dummy	3			Kuka	2
	Canada		Chile		France		Germany
Pacifier	100	Pacifier	100	Nipple	100	Dummy	100
Pacifier baby	26	Pacifiers	39	Pacifier	41	Baby	22
Pacifiers	22	Pacifier	24	Nipple	34	Pacifier baby	17
Pacifier	14	Avent	9	Baby	19	Mam	10
Newborn pacifier	8	Avent pacifier	6	Mam	19	Teat	9
Avent	7	Pacifier Dr Marinov	4	Baby nipple	16	Pacifier mam	9
Nipple	7	Pacifier	4	Baby bottle	15	Avent	8
Nuk	5	Newborn pacifier	4	Avent	12	Avent pacifier	7
Avent pacifier	4	Pacifier for you	4	Mam nipple	11	Nuk	6
Best pacifier	4	Avent pacifiers	3	Bottle nipple	11	Nuk pacifier	6
Dummy	4	Mam pacifier	3	Pacifier clip	9	Bite ring	5
Pacifier clip	4	How to erase a pacifier	3	Teats	8	Pacifier with name	4
Soothie	4	Pacifier holder	2	Pacifier	8	From when pacifier	4
Mam	3	Mam pacifiers	2	Pacifier avent	8	Pacifier	3
Nuk pacifier	3	Iron pacifier	2	Nuk	7	Weaning of pacifiers	3
Pacifier clips	3	Baby pacifier	2	Baby pacifier	7	Pacifier dm	3
Soothie pacifier	3	Iron pacifier	2	Dodie	7	Test pacifier	3

Soothers	3	How to get a pacifier	2	Baby pacifier	7	Pacifier chain	3
Mam pacifier	2	Pacifier pigeon	2	Mam pacifier	5	Baby with pacifier	2
Gumdrop pacifier	2	Pacifier drawing	1	Personalized pacifier	5	Pacifier bibs	2
Baby pacifier	2	Fruit pacifier	1	Pacifiers	5	Latex pacifier	2
Bibs pacifier	2			Nuk pacifier	4	Nip pacifier	2
Avent nipple	2			Pacifier clip	3	Rossmann pacifier	1
				Mam baby bottle	3	Baby bite ring	1
				Pacifier clip	3	Philips avent	1
Indonesia		Italy		Japan		Mexico	
Pacifier	100	Pacifier	100	Baby	100	Pacifier	100
Baby pacifier	50	The pacifier	20	Pacifier baby	100	Pacifier	25
Milk pacifier	15	Mam	8	Newborn pacifier	79	The pacifier	22
Pigeon pacifier	12	Chicco	7	newborn baby	76	Pacifiers	14
Pigeon	12	Pacifier mam	7	Pacifier kelp	58	Baby pacifier	9
Pacifier price	9	Pacifie chicco	6	Pacifier from when	53	Pacifier	8
Pacifier	9	Remove pacifier	4	Pacifier holder	24	Pacifier for baby	8
Baby milk pacifier	8	Avent	4	Finger pacifier	22	Pacifier	7

Baby pacifier bottle	6	Remove the pacifier	3	Pacifier how long	21	Avent	7
Cat pacifier	6	Newborn pacifier	3	Finger sucking	21	The pacifier	5
Avent pacifier	4	Pacifiers	3	Pacifier recommended	20	Newborn pacifier	5
Huki pacifier	4	Baby bottle	3	Nuuk	20	Avent pacifier	5
Baby pacifier prices	4	Avent pacifier	3	Pacifier nuuk	18	Pacifiers	5
Bottle of milk	4	Pacifier holder	3	Pacifier	17	Baby shower	3
Pigeon baby pacifiers	3	Soother	3	Pacifier sleep	16	Baby bottle	3
Newborn pacifier	3	Pacifier chain	2	Dummy	16	Pacifier for newborn	2
Nice baby pacifier	3	Pacifiers	2	Sleeping pacifier	15	How to remove pacifier	2
Pacifier image	3	Pacifier naples	2	Pacifier dentition	15	How to remove a pacifier	2
Fruit pacifier	2	Pacifier	2	Pacifier pigeon	15	Orthodontic pacifier	2
Baby cat pacifier	2	Silicone pacifier	2	Pacifier disinfection	14	Pacifier in english	1
Pacifier tug baby	2	How to take off the pacifier	2	Pacifier 1 month	14	How to remove pacifiers	1
Philips pacifier	2	Nuk	2	Feeding bottle	13	Pacifiers on the neck	1
Pacifier is	2	Pacifier with name	2	Pigeon	13		

Baby pacifier size	2	Pacifier teeth	1	Nuk	12		
Baby fruit pacifier	2	Sterilize pacifier	1	Nuk pacifier	12		
Netherlands		Poland		Romania		Saudi Arabia	
Pacifier	100	Soother pacifier	100	Pacifier	100	Pacifier	100
Teat	32	Teat	97	Pacifiers	47	Pacifier	58
Pacifier	23	Pacifiers	42	Nipple	31	For a pacifier	45
Avent	19	Avent	18	Avent	31	Pacifier	33
Pacifier baby	18	Hit	13	Avent pacifiers	12	Children's pacifiers	31
Pacifier avent	16	Avent pacifier	11	Avent nipple	9	Baby pacifier	25
Avent pacifier	15	Avent pacifiers	9	Pacifier	9	Avent pacifier	19
Difrax	14	Lovi pacifier	9	Avent pacifier	8	Pigeon pacifier	10
Difrax pacifier	12	Nuk	8	Pacifier chain	7	Pigeon pacifier	9
Pacifier bibi	12	Lovi pacifiers	6	Nuk pacifier	5	Pacifier	8
Bibi	11	Pacifier pendant	6	Fruit pacifier	4	Avent pacifier	8
Pacifiers	10	Bibs	6	Nuk pacifier	4	Baby pacifier	8
Bibs pacifiers	8	Bottle nipple	6	Philips avent	4	Children's pacifiers	8
Dr brownpacifiers	8	Pacifier bibs	5	Pacifier the baby	4	Pacifier for infants	7

Nipple baby	7	Nuk pacifier	5	Newborn pacifiers	4	Baby pacifier	5
Weaning	6	Canpol	5	Baby bottle	4	Event pacifier	5
Avent nipple	6	Bottle teats	5	Custom pacifiers	4	Baby pacifiers	4
Difrax nipple	4	A pacifier for a newborn baby	4	Baby tea	4	The bets pacifier for newborns	2
Prenatal	4	Tomme tippee	4	Orthodontic pacifier	3	Event pacifier	2
Pacifier with name	3	Canpol pacifier	4	Funny pacifiers	2		
Bibs nipple	3	Avent bottles	3	Pacifier the newborn	2		
Bibi nipple	3	Mam pacifier	3	Bibs pacifier	2		
Dr brown nipple	3	Tomme tippee pacifier	3	Avent natural nipple	2		
Philips avent pacifier	3	Baby pacifiers	3				
Nuk pacifier	3	Skid	3				
Spain		Taiwan		Turkey		United Kingdom	
Pacifier	100	Nipple	100	Pacifier	100	Dummy	100
Pacifiers	67	Vanilla pacifier	14	Avent	20	Dummies	41
The pacifier	15	Pigeon	11	Baby	18	Dummy baby	30
Baby pacifier	14	Pigeon pacifier	11	Avent pacifier	17	Pacifier	23
Personalized pacifiers	11	Pacifier	10	Baby pacifier	12	Mam	10

Suavinex	10	Baby bottle	9	Baby bottle	10	Dummy clips	9
Babys	8	Baby pacifier	7	Philips	8	Baby dummies	8
Baby pacifiers	7	Nipple head	6	Dummy chain	7	Tommee tippee	7
Suavinex pacifiers	6	Little lion pacifier	6	Philips avent	6	Dummy clip	7
Suavinex pacifier	5	Little lion king	5	Philips pacifier	6	Mam dummies	6
Nuk	4	Newborn pacifier	5	Philips avent pacifier	5	Pacifier baby	6
Silicone pacifier	4	Pacifier chain	5	Chicco	5	Babies dummies	6
Mam	4	Recommended pacifiers	4	Rubber	4	Dummy for baby	5
My pacifier	4	Quit pacifiers	4	Nuk	4	Pacifiers	5
Pacifier	3	Pacifier	4	Chicco pacifier	4	Tommee tippee dummies	4
Remove pacifier	3	Nuk pacifier	3	Nuk pacifier	3	Nuk	4
Pacifiers with name	3	Pacifier disinfection	3	Rubber pacifier	3	Personalised dummy	3
Avent	3	Nuk	3	Baby bottle teat	3	Mam dummy	3
Tous	3	Pigeon feeding bottle	3	Baby bottle avent	3	Baby with dummy	3
Tutete	3	Avent	3	Pacifier models	3	Dummies for babies	3

Baby bottles	3	Eugenic pacifier	3	Named pacifier	3	Nuk dummies	3
Newborn pacifier	3	Eugenic	3	Soothie pacifier	2	Tommee tippee dummy	3
Chicco	3	Avent pacifier	2	Baby pacifiers	2	Avent dummies	2
Baby bottle	3	Dummy	2	Newborn pacifier	2	Newborn dummies	2
Nuk pacifier	2	Pacifier	2	Gold pacifier	2	Dummy steriliser	2

United States		Venezuela	
Pacifier	100	Pacifier	100
Pacifiers	25	Pacifiers	25
Baby pacifier	24	Pacifier	19
Baby pacifiers	5	Baby pacifier	10
Newborn pacifier	5	Pacifier	9
Mam	5	How to make a pacifier	7
My pacifier	4	How to remove a pacifier	7
Best pacifier	4	How to erase a pacifier	4
Mam pacifier	4	How to make pacifiers	3
Pacifier use	4	How do you remove a pacifier	2
Nuk	4		

Pacifier for baby	4
Soothie pacifier	3
Pacifier clip	3
Avent	3
Nuk pacifier	3
Baby with pacifier	3
Dummy	3
Avent pacifier	3
Pacifier clips	2
Pacifier holder	2
Pacifier mouth	2
Best pacifiers	2
Teeth pacifier	2
Breastfeeding pacifier	2

Discussion

The presented study indicates an increase of interests on the Internet users on pacifiers' information since 2004, without the influence of monthly or quarterly seasonality and with significant impact of COVID-19 pandemic at five countries (between March 2020 to May 2021). The time series showed two patterns characterized by (a) linear increase of RSV values and (b) sigmoid curve; the other countries without defined pattern are included in a third group (c) without pattern of RSV values. In most cases, the Internet was used for searching about baby pacifiers, brands, and types. In a few countries, it was also detected interests in how to remove the sucking habit or concerns on dentition development.

Since 2004 pacifier-related searches increased independently of the development country level. The group (a) with linear increase volume of Internet-based searches was composed by 77.8% developed countries, except for Mexico and Saudi Arabia, whilst in the sigmoid ascendent curve group (b), we observed a higher percentual of developing countries, 27.5%, such as Brazil, Argentina, and Turkey. Those countries enhanced their searches in 2015 what can be explained by the growth on Internet access. Between 2005 and 2015 the Brazilian percentage of households with connection dropped from 13.6% to 58.3%. Argentina had the highest rate in 2015 (68%) and Turkey 53.7%. However, the internet penetration in households in developed countries was around 80% in 2015. Since this year the Internet penetration at these countries raised to 75%, 80% and 77.7% respectively in January 2021 (7). The third group (c) without curve pattern is composed by five countries, where 80% are countries under development, except for Netherlands.

Australia, Canada, and France showed increase on their pacifier-related searches since the beginning of COVID-19 pandemic and all of them belong to the same group (a). A Canadian trial reports up to 84% of infants use pacifier at least for some time (54) and this number can be justify once we can observe the RSV linear growth pattern since 2004 and the increase of internet searches with the pandemic arrival. Also, some studies suggested that use of pacifier are common between Australian mothers, from a group of 670 studied women's, 79% of them had introduced the pacifier (49). Similarly, in other population-based Australian study, 202 mother-infant pairs reported the use of pacifiers in 53.1% of the sample (56). Those two countries are famous for their immigration rates, most of them coming from United Kingdom, China, and India for both countries. Also, Australia has a great number of immigrants coming from New Zealand.

Currently, it is unknown the reasons behind the use of pacifiers, and whether they have become a cultural norm. The poor compliance in intervention studies suggested that the use of pacifiers is firmly entrenched in some cultures and that the reasons why mothers use pacifiers needs to be investigated and better understood to design effective interventions to reduce pacifier use (49). The reportedly wide variation in the use of a pacifier between different countries suggests that women from other cultures can use other methods that do not involve the use of a pacifier to effectively soothe their infant, for example, on this study, Turkish and Moroccan mothers frequently admonished, slapped, and shook their infant in response to crying (50). A recent study from Saudi Arabia showed that 40% of the children with mean age of 28.2 months had the pacifier use habit, it is the lowest prevalence founded among all observed countries (55). Perhaps

punishment is a common child rearing practice with young children in those cultural groups and can explain why their pacifier-related searches did not change with the COVID-19.

The findings of a multicenter study which reported a widespread difference between countries in the prevalence of pacifier use indicated that Japan had low rates of pacifier use and high rates of exclusive breastfeeding, whereas Italy had higher rates of pacifier use but more variable rates of breastfeeding (50). However, our findings showed different results from Japan and Italy, the first one enhanced the pacifier-related searches since the beginning of COVID-19 ($p=0,002$) while the second one decreased the search, even though it was not significant.

As well the prevalence of dummy use during the first year of life was approximately 55% at the Netherlands (57). At Spain 43% of children over 24 months of age still used a pacifier during sleep (41) and the overall prevalence of pacifier use in an investigation in Spain was 72.46% (28). In the United States, a study conducted on African American women revealed that 72.3% of mothers gave pacifiers to their children (30). An England novel showed that 36% of the children without exclusive breastfeeding at discharge had the pacifier use while 63.6% had exclusive breastfeeding at discharge and used pacifier to corroborate the other findings (58). All these data show that there is a high demand for pacifier use and we must know why mothers choose to introduce this habit on their children.

Maternal age less than 20, household income less than 15,000 PKR, and primiparity constituted the socioeconomic factors significantly related to the use of pacifiers. Women younger than 20 may be inexperienced, newer to motherhood, and more easily impressionable by parenting suggestions passed around them. Therefore, they may feel overwhelmed by the new responsibilities of motherhood or may not be able to adequately weigh the pros and cons of pacifier use. Pacifiers can relieve younger mothers for some time enabling them to perform all the necessary tasks and duties. (28) Also, Feldens et al. (2013) examined 375 Brazilian women and noted that those women who reported moderate-to-severe depressive symptoms at 12 months postpartum were 40% more likely to use a pacifier in the first year than other women in the sample (44).

A study reported that mothers with a minimal education level were more likely to give their child a pacifier in comparison to mothers with a higher degree. Another study reported a significant effect of maternal education on the age of pacifier withdrawal. The study concluded that higher the maternal education younger the age of pacifier withdrawal. Furthermore, the frequency of

dental visits influenced the relationship between maternal education and age of pacifier withdrawal (55). Also, the non-attendance of the mother at antenatal education classes was associated with a lower proportion initiating breastfeeding. This finding is supported by other studies (15,16) suggesting that duration of breastfeeding is also associated with lack of antenatal care. This may indicate that a lack of mothercraft knowledge influences breastfeeding or may reflect the maternal attitude to health issues (58).

The health education is an important matter to guide and inform the population about the health-related issues. Many professionals are involved to promote correct information about different health-related topics (e.g., doctors, dentists, nurses, social workers). These professionals can develop, promote, implement, and evaluate strategies to improve the population health and decrease the prevalence of many problems by providing information and guiding people to make better decisions. As we can see in our study, the educational level is directly related to the prevalence of pacifier use, but the key points are the knowledge of risks and benefits of this habit and when it should be removed to prevent deleterious effects. Those information are crucial once impact on children's development and can be easily solved providing health education to the population.

Only five countries had demonstrated queries related to concerns on the negative effects of pacifier on craniofacial complex and just USA had users interested in the relationship between pacifier and breastfeeding. This low demand for the effects of pacifiers on babies' teeth may indicate that parents and guardians are unaware that pacifiers can cause dental malocclusions. Meanwhile, the concern to remove this accessory is more common, demonstrating that these users know the need to cease this habit in children. We can notice that most countries (60%) that presented searches on the relationship between pacifiers and negative craniofacial effects are developed countries. However, among this group they represent just 23% of the developed countries. It is possible that those data came from their great education level and the higher population health information. Also, health professionals are concerned about the impact of the pacifier habit in the breastfeeding duration, but the users don't even seem to have this knowledge once there is just one country where this relationship was searched (USA).

Although, there are searches for how to remove the pacifier from children and parents seems to be aware that they need to take action to stop this habit, there are no online interest in finding the recommended age to start this process. Perhaps because orthodontic pacifiers are very popular today on the internet, which is source of information to the self-resolution of many

problems, and they are recommended by digital influencers, vendors, and laypersons with market interests parents feel less guilty about introduce it to their children's routine and do not worry so much about the problems it can cause if this habit perpetuates over the years. However, there is no scientific evidence to support the use of orthodontic pacifier in averting malocclusions, but it is important to educate and inform parents about the maximum age to remove this habit, because this attitude can help and prevent malocclusion and orofacial problems as we know. (62)

In Argentina, Chile, Indonesia and Romania, people were interested in fruit pacifiers, frequently used in the introduction of solid food to babies. Parents are very afraid that their children will choke on food due to the different textures presented to them. However, there is no evidence that a fruit feeder provides any additional safety against choking on foods. In fact, there is a gap in scientific research establishing the overall safety of such devices for feeding infants and young children. (29)

The use of behavior data online expands the understanding of health information and needs to be disseminated, so the researchers can better understand the trends in the Internet search for health information and in health research (32,33). The rhythmic clear and robust patterns and variations of the Google Trends RSVs can be identifiable and serve to manage health actions at local level, allowing to track temporal variations of behaviors, providing an alternative to predict data health-related behaviors. (34)

This novel approach presents some limitations that need to be considered to the results interpretation. First, it is the lack of methodological standardization, although the infodemiology is a promising research tool in the field of collective behavior. Second, the Google Trends data, as it is the only search engine that offers real-time, public accessible data analysis and allows the publication of similar surveys. Third, and most important, is the person who performed the search, as it is impossible to affirm who did it (parents, relatives, health professionals, etc.). Also, it is impossible to know if they were directly interested in introducing the pacifier to their babies or children.

Conclusion

In conclusion, the interests of Google users on pacifiers are increasingly popular at most countries over time and these findings indicate that parents need more information and guidance about pacifiers' use such as: frequency and duration of this habit and mainly the maximum age to

remove it. Also, the COVID-19 did not influence as much we can imagine the online health information seeking behavior, whereas there is an increase on pacifier-related search since 2004 and 22,7% of all 22 observed countries had a significative enhance on that quest.

References

1. Lewis, T. Seeking health information on the internet: lifestyle choice or bad attack of cyberchondria? *Media Culture & Society* 2006;28:521-39.
2. Agree, E.M. et al. It's got to be on this page: age and cognitive style in a study of online health information seeking. *J Med Internet Res.* 2015 Mar; 17(3): e79. Published online 2015 Mar 24. doi: 10.2196/jmir.3352
3. Schmid, K.M., Kugler, R., Nalabothu, P. *et al.* The effect of pacifier sucking on orofacial structures: a systematic literature review. *Prog Orthod.* **19**, 8 (2018). <https://doi.org/10.1186/s40510-018-0206-4>
4. Moimaz, S.A.S., Garbin, A.J.Í., Lima, A.M.C. *et al.* Longitudinal study of habits leading to malocclusion development in childhood. *BMC Oral Health* **14**, 96 (2014). <https://doi.org/10.1186/1472-6831-14-96>
5. Castilho, S.D., Rocha, M.A. Pacifier habit: history and multidisciplinary view. *J Pediatr (Rio J)*. 2009;85(6):480-489. Manuscript submitted May 25 2009, accepted for publication Sep 7 2009
6. Nuti, S.V., Wayda, B., Ranasinghe, I., Wang, S., Dreyer, R.P., Chen, S.I., Murugiah, K. The use of google trends in health care research: a systematic review. *PLoS One*. 2014 Oct 22;9(10):e109583. doi: 10.1371/journal.pone.0109583. PMID: 25337815; PMCID: PMC4215636.
7. The World Bank (2016). World development indicators: internet users (per 100 people).
8. Corrêa, C.C. et al. Interferência dos bicos ortodônticos e convencionais no sistema estomatognático: revisão sistemática. *CoDAS [online]*. 2016, v. 28, n. 2 [Acessado 19 Março 2022] ,pp. 182-189. Disponível em: <<https://doi.org/10.1590/2317-1782/20162015024>>. Epub Mar-Apr 2016. ISSN 2317-1782. <https://doi.org/10.1590/2317-1782/20162015024>.
9. Agarwal, S.S., Nehra, K., Sharma, M. *et al.* Association between breastfeeding duration, non-nutritive sucking habits and dental arch dimensions in deciduous dentition: a cross-sectional study. *Prog Orthod.* **15**, 59 (2014). <https://doi.org/10.1186/s40510-014-0059>
10. Montaldo, L., Montaldo, P., Cuccaro, P., Caramico, N., Minervini, G. Effects of feeding on non-nutritive sucking habits and implications on occlusion in mixed dentition. *International Journal of Paediatric Dentistry*. 2011 Jan;21(1):68-73.
11. Foroughi, F., Lam, A.K., Lim, M.S.C., Saremi, N., Ahmadvand, A. "Googling" for Cancer: An Infodemiological Assessment of Online Search Interests in Australia, Canada, New Zealand, the United Kingdom, and the United States. *JMIR Cancer*. 2016 May 4;2(1):e5. doi: 10.2196/cancer.5212. PMID: 28410185; PMCID: PMC5369660.

12. Aguirre, P.E., Coelho, M., Oliveira, T., Rios, D., Cruvinel, A.F., Cruvinel, T. What Can Google Inform Us about People's Interests regarding Dental Caries in Different Populations? *Caries Res.* 2018;52(3):177-188. doi: 10.1159/000485107. Epub 2018 Jan 20. PMID: 29353276.
13. Duncan, K., Mcnamara, C., Ireland, A.J. and Sandy, J.R. (2008), Sucking habits in childhood and the effects on the primary dentition: findings of the Avon Longitudinal Study of Pregnancy and Childhood. *International Journal of Paediatric Dentistry*, 18: 178-188. <https://doi.org/10.1111/j.1365-263X.2007.00905.x>
14. Herrera, S., Pierrat, V., Kaminski, M., Benhammou, V., Bonnet, A.L., Ancel, P.Y., Germa, A. Factors associated with non-nutritive sucking habits at 2 years of age among very preterm children: EPIPAGE-2 cohort study. *Paediatr Perinat Epidemiol.* 2021 Mar;35(2):217-226. doi: 10.1111/ppe.12725. Epub 2020 Oct 5. PMID: 33016411.
15. Shetty, R. M., Shetty, M., Shetty, N. S., Deogshare, A. Three-Alarm System: Revisited to treat Thumb-sucking Habit. *Int J Clin Pediatr Dent.* 2015 Jan-Apr; 8(1): 82–86. Published online 2015 Apr 28. doi: [10.5005/jp-journals-10005-1289](https://doi.org/10.5005/jp-journals-10005-1289)
16. Moimaz, S.A., Zina, L.G., Saliba, N.A., Saliba, O. Association between breast-feeding practices and sucking habits: a cross-sectional study of children in their first year of life. *J Indian Soc Pedod Prev Dent.* 2008 Sep;26(3):102-6. doi: 10.4103/0970-4388.43188. PMID: 18923221.
17. Caruso, S., Nota, A., Darvizeh, A. *et al.* Poor oral habits and malocclusions after usage of orthodontic pacifiers: an observational study on 3–5 years old children. *BMC Pediatr* **19**, 294 (2019). <https://doi.org/10.1186/s12887-019-1668-3>
18. Kamdar, R. J., & Al-Shahrani, I. (2015). Damaging oral habits. *Journal of international oral health : JIOH*, 7(4), 85–87.
19. Butler, R., Moore, M., Mindell, J.A. Pacifier Use, Finger Sucking, and Infant Sleep. *Behav Sleep Med.* 2016 Nov-Dec;14(6):615-23. doi: 10.1080/15402002.2015.1048451. Epub 2015 Nov 7. PMID: 26548755.
20. Lopes-Freire, G. M., Cárdenas, A. B., Suarez de Deza, J. E., Ustrell-Torrent, J. M., Oliveira, L. B., & Boj Quesada, J. R., Jr (2015). Exploring the association between feeding habits, non-nutritive sucking habits, and malocclusions in the deciduous dentition. *Progress in orthodontics*, 16, 43. <https://doi.org/10.1186/s40510-015-0113-x>
21. Rocha, C.R., Verga, K.E., Sipsma, H.L., Larson, I.A, Phillipi, C.A., Kair, L.R..Breastfeeding Medicine.Jan 2020.24-28.<http://doi.org/10.1089/bfm.2019.0174>
22. Kair, L.R., Kenron, D., Etheredge, K., et al. Pacifier restriction and exclusive breastfeeding. *Pediatrics* 2013;131:e1101– e1107.
23. Buccini, G.D.S., Perez-Escamilla, R., Paulino, L.M., et al. Pacifier use and interruption of exclusive breastfeeding: Systematic review and meta-analysis. *Matern Child Nutr* 2017;13; DOI: 10.1111/mcn.12384

24. Jaafar, S.H., Ho, J.J., Jahanfar, S., et al. Effect of restricted pacifier use in breastfeeding term infants for increasing duration of breastfeeding. *Cochrane Database Syst Rev* 2016:CD007202.
25. Lotto, M., Aguirre, P.E.A., Neto, N.L., Cruvinel, A.F., Cruvinel, T. Is the Quality of Toothache-Related Information Published in Brazilian Websites Adequate to Assist People in Seeking Dental Treatment? *Oral Health Prev Dent.* 2020 Apr 1;18(1):301-309. doi: 10.3290/j.ohpd.a44142. PMID: 32618453.
26. Cavazos-Rehg, P.A., Krauss, M.J., Spitznagel, E.L., et al. Monitoring of non-cigarette tobacco use using Google Trends. *Tobacco Control* 2015;24:249-255.
27. DataReportal (2021), “Digital 2021 Global Digital Overview”, retrieved from <https://datareportal.com/reports/digital-2021-global-digital-overview>
28. Riaz, R., Ahmed, M., Baloch, M., et al. (December 27, 2020) Frequency and Predictors of Pacifier Use in the Low Socioeconomic Group of Karachi, Pakistan: A Cross-Sectional Study. *Cureus* 12(12): e12324. doi:10.7759/cureus.12324
29. Theurich, M.A. Are Modern Complementary Food Packaging, Devices and Teats Compatible with International Guidance on Complementary Feeding? *Journal of Human Lactation* 2020, Vol. 36(1) 29–33
30. Joyner, B.L., Oden, R.P. & Moon, R.Y. Reasons for Pacifier Use and Non-Use in African-Americans: Does Knowledge of Reduced SIDS Risk Change Parents’ Minds?. *J Immigrant Minority Health* 18, 402–410 (2016). <https://doi.org/10.1007/s10903-015-0206-0>
31. Peres, K.G. et al. Effects of breastfeeding and sucking habits on malocclusion in a birth cohort study. *Revista de Saúde Pública* [online]. 2007, v. 41, n. 3 [Accessed 19 March 2022] , pp. 343-350. Available from: <<https://doi.org/10.1590/S0034-89102007000300004>>. Epub 16 May 2007. ISSN 1518-8787. <https://doi.org/10.1590/S0034-89102007000300004>.
32. Effenberger, M., Kronbichler, A., Shin, J., Mayer, G., Tilg, H. & Perco, P. (2020). Association of the COVID-19 pandemic with Internet Search Volumes: A Google Trends™ Analysis. *International Journal of Infectious Diseases*, 95, 192-197
33. Tana, J. (2019). Infodemiology Studying rhythmicity in online health information behaviour. Åbo Akademi University.
34. Máximo, N.R.G., Mota, J.V.T., Sá, D.D. de, Mourão, A. Édie B., GIRÃO, M.V.D. Infodemiological study of the COVID-19 pandemic association in Brazil and the volume of internet search. **Research, Society and Development**, [S. l.], v. 10, n. 9, p. e1010917817, 2021. DOI: 10.33448/rsd-v10i9.17871. Disponível em: <https://rsdjournal.org/index.php/rsd/article/view/17871>. Acesso em: 19 mar. 2022.
35. O’Connor, N.R., Tanabe, K.O., Siadaty, M.S., Hauck, F.R. Pacifiers and Breastfeeding: A Systematic Review. *Arch Pediatr Adolesc Med.* 2009;163(4):378–382. doi:10.1001/archpediatrics.2008.578
36. Victora, C.G., Behague, D.P., Barros, F. C., Olinto, M. T. A., Weiderpass, E.: Pacifier Use and Short Breastfeeding Duration: Cause, Consequence, or Coincidence? *Pediatrics* March 1997; 99 (3): 445–453. 10.1542/peds.99.3.445

37. McMullan, M. Patients using the Internet to obtain health information: How this affects the patient–health professional relationship, *Patient Education and Counseling*, Volume 63, Issues 1-2, 2006, Pages 24-28, ISSN 0738-3991, <https://doi.org/10.1016/j.pec.2005.10.006>.
38. AlGhamdi, K.M., Moussa, N.A. Internet use by the public to search for health-related information, *International Journal of Medical Informatics*, Volume 81, Issue 6, 2012, Pages 363-373, ISSN 1386-5056, <https://doi.org/10.1016/j.ijmedinf.2011.12.004>.
39. Harorli, O.T., Harorli, H. Evaluation of internet search trends of some common oral problems, 2004 to 2014. *Community Dental Health*. 2014 Sep;31(3):188-192. PMID: 25300156.
40. Lotto, M., Aguirre, P.E.A., Rios, D., Machado, M.A.A.M., Cruvinel, A.F.P., Cruvinel, T. (2017) Analysis of the interests of Google users on toothache information. *PLoS ONE* 12(10): e0186059. <https://doi.org/10.1371/journal.pone.0186059>
41. Cassanello, P., Ruiz-Botia, I., Díez-Izquierdo, A. *et al.* How do infants and toddlers sleep in Spain? A cross-sectional study. *Eur J Pediatr* **180**, 775–782 (2021). <https://doi.org/10.1007/s00431-020-03786-2>
42. Lotto, M., Aguirre, P.E.A., Strieder, A.P., Cruvinel, A.F.P., Cruvinel, T. 2019. Levels of toothache-related interests of Google and YouTube users from developed and developing countries over time. *PeerJ* 7: e7706 <https://doi.org/10.7717/peerj.7706>
43. Cruvinel, T., Aguirre, P.E.A., Lotto, M., Oliveira, T.M., Rios, D., Cruvinel, A.F.P. Digital behavior surveillance: Monitoring dental caries and toothache interests of Google users from developing countries. *Oral Dis*. 2019;25:339–347. <https://doi.org/10.1111/odi.12986>
44. Feldens, C.A., Ardenghi, T.M., Cruz, L.N., Scalco, G., Vítolo, M.R. Advising mothers about breastfeeding and weaning reduced pacifier use in the first year of life: a randomized trial. *Community Dent Oral Epidemiol* 2013; 41: 317– 326. © 2012 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd
45. Aguirre, P.E.A., Lotto, M., Strieder, A.P., Cruvinel, T. Digital surveillance: Monitoring the activity of Internet users searching for information related to early childhood caries. *Health Informatics Journal*. January 2022. doi:10.1177/14604582211073057
46. Aguirre, P.E.A., Strieder, A.P., Lotto, M., et al. Are the Internet users concerned about molar incisor hypomineralization? An infoveillance study. *Int J Paediatr Dent*. 2019;00:1–8. <https://doi.org/10.1111/ipd.12579>
47. Meade, M. and Dreyer, C. (2022), The quality and readability of online molar incisor hypomineralization patient education materials: a systematic analysis. *Aust Dent J*. <https://doi.org/10.1111/adj.12899>
48. Strieder, A.P., Aguirre, P.E.A., Lotto, M., Cruvinel, A.F.P., Cruvinel, T. Digital behavior surveillance for monitoring the interests of Google users in amber necklace in different countries. *Int J Paediatr Dent*. 2019; 29: 603- 614. <https://doi.org/10.1111/ipd.12500>
49. Mauch, C.E., Scott, J.A., Magarey, A.M. *et al.* Predictors of and reasons for pacifier use in first-time mothers: an observational study. *BMC Pediatr* **12**, 7 (2012). <https://doi.org/10.1186/1471-2431-12-7>

50. Nelson, E.A., Yu, L.M., Williams, S.: International Child Care Practices study: breastfeeding and pacifier use. *J Hum Lact.* 2005, 21 (3): 289-295. 10.1177/0890334405278489.
51. Van der Wal, M. F., Van den Boom, D. C., Pauw-Plomp, H. *et al.* Mothers' reports of infant crying and soothing in a multicultural population. *Archives of Disease in Childhood* 1998;**79**:312-317.
52. Moon, R.Y. TASK FORCE ON SUDDEN INFANT DEATH SYNDROME. SIDS and Other Sleep-Related Infant Deaths: Evidence Base for 2016 Updated Recommendations for a Safe Infant Sleeping Environment. *Pediatrics.* 2016;138(5): e20162940
53. Baby Friendly USA The ten steps to successful breastfeeding: final report. East Sandwich; MA, Baby Friendly USA (2005)
54. Kramer, M.S., Barr, R.G., Dagenais, S., Yang, H., Jones, P., Ciofani, L., *et al.* **Pacifier use, early weaning, and cry/fuss behavior: a randomized controlled trial** *JAMA*, 286 (3) (2001), pp. 322-326
55. Kakti, A.A., Alabdullah, A.S., Alahmed, A., Alhowajji, Z., Alswailem, E., Alhassan, H. Prevalence of pacifier use and the impact of maternal education and regularity of dental visits on the age of pacifier withdrawal. *J Indian Soc Pedod Prev Dent* 2019;**37**:8-11
56. MacMillan, K.K., Lewis, A.J., Watson, S.T., Power, J., Galbally, M. Maternal psychosocial predictors of pacifier use in a mother-infant interaction task: An observational study from the MPEWS pregnancy cohort, *Infant Behavior and Development*, Volume 61, 2020, 101505, ISSN 0163-6383 <https://doi.org/10.1016/j.infbeh.2020.101505>
57. Arnestad, M., Andersen, M., & Rognum, T.O. (1997). Is the use of dummy or carry-cot of importance for sudden infant death? *European Journal of Pediatrics*, 156, 968-970.
58. Clements, M.S., Mitchell, E.A., Wright, S.P., Esmail, A., Jones, D.R., Ford, R.P. Influences on breastfeeding in southeast England. *Acta Paediatr.* 1997 Jan;**86**(1):51-6. doi: 10.1111/j.1651-2227.1997.tb08831.x. PMID: 9116426.
59. <https://www.pewresearch.org/global/2016/02/22/internet-access-growing-worldwide-but-remains-higher-in-advanced-economies/>
60. Rizzato, V. L., Lotto, M., Cruvinel, T. (2021). Raw data of the manuscript: "Digital surveillance: The interests in toothache-related information after the outbreak of COVID-19". *Figshare, Collection.* <https://doi.org/10.6084/m9.figshare.c.5428572.v2> [Google Scholar](#)
61. The World Health Organization (2021). <https://www.who.int/countries>
62. Scudine KGO, Freitas CN, Nascimento-Moraes KSG, Bommarito S, Possobon RdF, Boni RC and Castelo PM (2021) Multidisciplinary Evaluation of Pacifier Removal on Oro-Dentofacial Structures: A Controlled Clinical Trial. *Front. Pediatr.* 9:703695. doi: 10.3389/fped.2021.703695

3. CONSIDERAÇÕES FINAIS

As buscas online por informações de saúde não são recentes e, desde que a população teve acesso à internet, esse hábito se tornou cada vez mais frequente. Nos países desenvolvidos os usuários tiveram contato com essa ferramenta antes dos demais, mas, hoje em dia, esse já se tornou um hábito mundial. Dessa forma, muitos leigos buscam informações de saúde na internet com o intuito de curar doenças, procurar medicamentos, tratamentos e até diagnósticos sem a orientação de um profissional capacitado. Por isso, precisamos refletir sobre a qualidade dessa informação disponível e por que os pacientes buscam tantas respostas em fontes não tão seguras quanto o profissional de saúde. Acreditávamos que a pandemia do COVID-19 aumentaria as buscas pelo termo chupeta, já que os pais e responsáveis precisavam trabalhar em casa dividindo esse ambiente com seus filhos. No entanto, o aumento significativo nas buscas após o início da pandemia só foi encontrado em alguns países. Mais estudos com o intuito de explicar quais os principais temas buscados e porque os pacientes realizam essa busca online por informação de saúde devem ser feitos para orientar as autoridades, fiscalizar esses dados disponíveis na internet e preparar os profissionais de saúde para esclarecer os questionamentos dos seus pacientes.

REFERÊNCIAS

LEWIS, T. Seeking health information on the internet: lifestyle choice or bad attack of cyberchondria? *Media Culture & Society* 2006;28:521-39.

AGREE, E. M. et al. It's got to be on this page: age and cognitive style in a study of online health information seeking. *J Med Internet Res.* 2015 Mar; 17(3): e79. Published online 2015 Mar 24. doi: 10.2196/jmir.3352

SCHMID, K. M.; KUGLER, R.; NALABOTHU, P. *et al.* The effect of pacifier sucking on orofacial structures: a systematic literature review. *Prog Orthod.* **19**, 8 (2018). <https://doi.org/10.1186/s40510-018-0206-4>

MOIMAZ, S. A. S.; GARBIN, A. J. Í.; LIMA, A. M. C. *et al.* Longitudinal study of habits leading to malocclusion development in childhood. *BMC Oral Health* **14**, 96 (2014). <https://doi.org/10.1186/1472-6831-14-96>

CASTILHO, S. D.; ROCHA, M. A. Pacifier habit: history and multidisciplinary view. *J Pediatr (Rio J)*. 2009;85(6):480-489. Manuscript submitted May 25 2009, accepted for publication Sep 7 2009

NUTI, S. V.; WAYDA, B.; RANASINGHE, I.; WANG, S.; DREYER, R. P.; CHEN, S. I.; MURUGIAH, K. The use of google trends in health care research: a systematic review. *PLoS One.* 2014 Oct 22;9(10):e109583. doi: 10.1371/journal.pone.0109583. PMID: 25337815; PMCID: PMC4215636.

The World Bank (2016). World development indicators: internet users (per 100 people).

CORRÊA, C. C. et al. Interferência dos bicos ortodônticos e convencionais no sistema estomatognático: revisão sistemática. *CoDAS [online]*. 2016, v. 28, n. 2 [Acessado 19 Março 2022], pp. 182-189. Disponível em: <<https://doi.org/10.1590/2317-1782/20162015024>>. Epub Mar-Apr 2016. ISSN 2317-1782. <https://doi.org/10.1590/2317-1782/20162015024>.

AGARWAL, S. S.; NEHRA, K.; SHARMA, M. *et al.* Association between breastfeeding duration, non-nutritive sucking habits and dental arch dimensions in deciduous dentition: a cross-sectional study. *Prog Orthod.* **15**, 59 (2014). <https://doi.org/10.1186/s40510-014-0059>

MONTALDO, L.; MONTALDO, P.; CUCCARO, P.; CARAMICO, N.; MINERVINI, G. Effects of feeding on non-nutritive sucking habits and implications on occlusion in mixed dentition. *International Journal of Paediatric Dentistry*. 2011 Jan;21(1):68-73.

FOROUGH, F.; LAM, A. K.; LIM, M. S. C.; SAREMI, N.; AHMADVAND, A. "Googling" for Cancer: An Infodemiological Assessment of Online Search Interests in Australia, Canada, New Zealand, the United Kingdom, and the United States. *JMIR Cancer*. 2016 May 4;2(1):e5. doi: 10.2196/cancer.5212. PMID: 28410185; PMCID: PMC5369660.

AGUIRRE, P.E.; COELHO, M.; OLIVEIRA, T.; RIOS, D.; CRUVINEL, A. F.; CRUVINEL, T. What Can Google Inform Us about People's Interests regarding Dental Caries in Different Populations? *Caries Res*. 2018;52(3):177-188. doi: 10.1159/000485107. Epub 2018 Jan 20. PMID: 29353276.

DUNCAN, K.; MCNAMARA, C.; IRELAND, A. J.; SANDY, J. R. (2008), Sucking habits in childhood and the effects on the primary dentition: findings of the Avon Longitudinal Study of Pregnancy and Childhood. *International Journal of Paediatric Dentistry*, 18: 178-188. <https://doi.org/10.1111/j.1365-263X.2007.00905.x>

HERRERA, S.; PIERRAT, V.; KAMINSKI, M.; BENHAMMOU, V.; BONNET, A. L.; ANCEL, P. Y.; GERMA, A. Factors associated with non-nutritive sucking habits at 2 years of age among very preterm children: EPIPAGE-2 cohort study. *Paediatr Perinat Epidemiol*. 2021 Mar;35(2):217-226. doi: 10.1111/ppe.12725. Epub 2020 Oct 5. PMID: 33016411.

SHETTY, R. M.; SHETTY, M.; SHETTY, N. S.; DEOGSHARE, A. Three-Alarm System: Revisited to treat Thumb-sucking Habit. *Int J Clin Pediatr Dent*. 2015 Jan-Apr; 8(1): 82–86. Published online 2015 Apr 28. doi: [10.5005/jp-journals-10005-1289](https://doi.org/10.5005/jp-journals-10005-1289)

MOIMAZ, S. A.; ZINA, L. G.; SALIBA, N. A.; SALIBA, O. Association between breast-feeding practices and sucking habits: a cross-sectional study of children in their first year of life. *J Indian Soc Pedod Prev Dent*. 2008 Sep;26(3):102-6. doi: 10.4103/0970-4388.43188. PMID: 18923221.

CARUSO, S.; NOTA, A.; DARVIZEH, A. *et al.* Poor oral habits and malocclusions after usage of orthodontic pacifiers: an observational study on 3–5 years old children. *BMC Pediatr* **19**, 294 (2019). <https://doi.org/10.1186/s12887-019-1668-3>

KAMDAR, R. J.; AL-SHAHRANI, I. (2015). Damaging oral habits. *Journal of international oral health : JIOH*, 7(4), 85–87.

BUTLER, R.; MOORE, M.; MINDELL, J. A. Pacifier Use, Finger Sucking, and Infant Sleep. *Behav Sleep Med*. 2016 Nov-Dec;14(6):615-23. doi: 10.1080/15402002.2015.1048451. Epub 2015 Nov 7. PMID: 26548755.

LOPES-FREIRE, G. M.; CÁRDENAS, A. B.; SUAREZ, J. E., USTRELL-TORRENT, J. M.; OLIVEIRA, L. B.; BOJ QUESADA, J. R. (2015). Exploring the association between feeding habits, non-nutritive sucking habits, and malocclusions in the deciduous dentition. *Progress in orthodontics*, 16, 43. <https://doi.org/10.1186/s40510-015-0113-x>

ROCHA, C. R.; VERGA, K. E.; SIP SMA, H. L.; LARSON, I. A.; PHILLIPI, C. A.; KAIR, L. R..Breastfeeding Medicine.Jan 2020.24-28.<http://doi.org/10.1089/bfm.2019.0174>

KAIR, L. R.; KENRON, D.; ETHEREDGE, K., et al. Pacifier restriction and exclusive breastfeeding. *Pediatrics* 2013;131:e1101– e1107.

BUCCINI, G. D. S.; PEREZ--ESCAMILLA, R.; PAULINO, L. M., et al. Pacifier use and interruption of exclusive breastfeeding: Systematic review and meta-analysis. *Matern Child Nutr* 2017;13; DOI: 10.1111/mcn.12384

JAAFAR, S. H.; HO, J. J.; JAHANFAR, S., et al. Effect of restricted pacifier use in breastfeeding term infants for increasing duration of breastfeeding. *Cochrane Database Syst Rev* 2016:CD007202.

LOTTO, M.; AGUIRRE, P. E. A.; NETO, N. L.; CRUVINEL, A. F.; CRUVINEL, T. Is the Quality of Toothache-Related Information Published in Brazilian Websites Adequate to Assist People in Seeking Dental Treatment? *Oral Health Prev Dent*. 2020 Apr 1;18(1):301-309. doi: 10.3290/j.ohpd.a44142. PMID: 32618453.

CAVAZOS-REHG, P. A.; KRAUSS, M. J.; SPITZNAGEL, E. L., et al. Monitoring of non-cigarette tobacco use using Google Trends. *Tobacco Control* 2015;24:249-255.

DataReportal (2021), “Digital 2021 Global Digital Overview”, retrieved from <https://datareportal.com/reports/digital-2021-global-digital-overview>

RIAZ, R.; AHMED, M.; BALOCH, M., et al. (December 27, 2020) Frequency and Predictors of Pacifier Use in the Low Socioeconomic Group of Karachi, Pakistan: A Cross-Sectional Study. *Cureus* 12(12): e12324. doi:10.7759/cureus.12324

THEURICH, M. A. Are Modern Complementary Food Packaging, Devices and Teats Compatible with International Guidance on Complementary Feeding? *Journal of Human Lactation* 2020, Vol. 36(1) 29–33

JOYNER, B. L.; ODEN, R. P.; MOON, R. Y. Reasons for Pacifier Use and Non-Use in African-Americans: Does Knowledge of Reduced SIDS Risk Change Parents' Minds?. *J Immigrant Minority Health* **18**, 402–410 (2016). <https://doi.org/10.1007/s10903-015-0206-0>

PERES, K. G. et al. Effects of breastfeeding and sucking habits on malocclusion in a birth cohort study. *Revista de Saúde Pública* [online]. 2007, v. 41, n. 3 [Accessed 19 March 2022] , pp. 343-350. Available from: <<https://doi.org/10.1590/S0034-89102007000300004>>. Epub 16 May 2007. ISSN 1518-8787. <https://doi.org/10.1590/S0034-89102007000300004>.

EFFENBERGER, M.; KRONBICHLER, A.; SHIN, J.; MAYER, G.; TILG, H.; PERCO, P. (2020). Association of the COVID-19 pandemic with Internet Search Volumes: A Google Trends™ Analysis. *International Journal of Infectious Diseases*, 95, 192-197

TANA, J. (2019). Infodemiology Studying rhythmicity in online health information behaviour. Åbo Akademi University.

MÁXIMO, N. R. G.; MOTA, J. V. T.; SÁ, D. D.; de, MOURÃO, A.; ÉDIE, B.; GIRÃO, M. V. D. Infodemiological study of the COVID-19 pandemic association in Brazil and the volume of internet search. **Research, Society and Development**, [S. l.], v. 10, n. 9, p. e1010917817, 2021. DOI: 10.33448/rsd-v10i9.17871. Disponível em: <https://rsdjournal.org/index.php/rsd/article/view/17871>. Acesso em: 19 mar. 2022.

O'CONNOR, N. R.; TANABE, K. O.; SIADATY, M. S.; HAUCK, F. R. Pacifiers and Breastfeeding: A Systematic Review. *Arch Pediatr Adolesc Med*. 2009;163(4):378–382. doi:10.1001/archpediatrics.2008.578

VICTORA, C. G.; BEHAGUE, D. P.; BARROS, F. C.; OLINTO, M. T. A.; WEIDERPASS, E.: Pacifier Use and Short Breastfeeding Duration: Cause, Consequence, or Coincidence? *Pediatrics* March 1997; 99 (3): 445–453. 10.1542/peds.99.3.445

MCMULLAN, M. Patients using the Internet to obtain health information: How this affects the patient–health professional relationship, *Patient Education and Counseling*, Volume 63, Issues 1-2, 2006, Pages 24-28, ISSN 0738-3991, <https://doi.org/10.1016/j.pec.2005.10.006>.

ALGHAMDI, K. M.; MOUSSA, N. A. Internet use by the public to search for health-related information, *International Journal of Medical Informatics*, Volume 81, Issue 6, 2012, Pages 363-373, ISSN 1386-5056, <https://doi.org/10.1016/j.ijmedinf.2011.12.004>.

HARORLI, O. T.; HARORLI, H. Evaluation of internet search trends of some common oral problems, 2004 to 2014. *Community Dental Health*. 2014 Sep;31(3):188-192. PMID: 25300156.

LOTTO, M.; AGUIRRE, P. E. A.; RIOS, D.; MACHADO, M. A. A. M.; CRUVINEL, A. F. P.; CRUVINEL, T. (2017) Analysis of the interests of Google users on toothache information. *PLoS ONE* 12(10): e0186059. <https://doi.org/10.1371/journal.pone.0186059>

CASSANELLO, P.; RUIZ-BOTIA, I.; DÍEZ-IZQUIERDO, A. *et al.* How do infants and toddlers sleep in Spain? A cross-sectional study. *Eur J Pediatr* **180**, 775–782 (2021). <https://doi.org/10.1007/s00431-020-03786-2>

LOTTO, M.; AGUIRRE, P. E. A.; STRIEDER, A. P.; CRUVINEL, A. F. P.; CRUVINEL, T. Levels of toothache-related interests of Google and YouTube users from developed and developing countries over time. *PeerJ* 7: e7706, 2019. <https://doi.org/10.7717/peerj.7706>

CRUVINEL, T.; AGUIRRE, P. E. A.; LOTTO, M.; OLIVEIRA, T. M.; RIOS, D.; CRUVINEL, A. F. P. Digital behavior surveillance: Monitoring dental caries and toothache interests of Google users from developing countries. *Oral Dis*. 2019;25:339–347. <https://doi.org/10.1111/odi.12986>

FELDENS, C. A.; ARDENGHI, T. M.; CRUZ, L. N.; SCALCO, G.; VÍTOLO, M. R. Advising mothers about breastfeeding and weaning reduced pacifier use in the first year of life: a randomized trial. *Community Dent Oral Epidemiol* 2013; 41: 317– 326. © 2012 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd

AGUIRRE, P. E. A.; LOTTO, M.; STRIEDER, A. P.; CRUVINEL, T. Digital surveillance: Monitoring the activity of Internet users searching for information related to early childhood caries. *Health Informatics Journal*. January 2022. doi:10.1177/14604582211073057

AGUIRRE, P. E. A.; LOTTO, M.; STRIEDER, A. P., et al. Are the Internet users concerned about molar incisor hypomineralization? An infoveillance study. *Int J Paediatr Dent*. 2019;00:1–8. <https://doi.org/10.1111/ipd.12579>

MEADE, M.; DREYER, C. (2022), The quality and readability of online molar incisor hypomineralization patient education materials: a systematic analysis. *Aust Dent J.* <https://doi.org/10.1111/adj.12899>

STRIEDER, A. P.; AGUIRRE, P. E. A.; LOTTO, M.; CRUVINEL, A. F. P.; CRUVINEL, T. Digital behavior surveillance for monitoring the interests of Google users in amber necklace in different countries. *Int J Paediatr Dent.* 2019; 29: 603- 614. <https://doi.org/10.1111/ipd.12500>

MAUCH, C. E.; SCOTT, J. A.; MAGAREY, A. M. *et al.* Predictors of and reasons for pacifier use in first-time mothers: an observational study. *BMC Pediatr* **12**, 7 (2012). <https://doi.org/10.1186/1471-2431-12-7>

Nelson, E.A., Yu, L.M., Williams, S.: International Child Care Practices study: breastfeeding and pacifier use. *J Hum Lact.* 2005, 21 (3): 289-295. 10.1177/0890334405278489.

VAN DER WALL, M. F.; VAN DEN BOON, D. C.; PAUW-PLOMP, H. *et al.* Mothers' reports of infant crying and soothing in a multicultural population. *Archives of Disease in Childhood* 1998;**79**:312-317.

MOON, R. Y. TASK FORCE ON SUDDEN INFANT DEATH SYNDROME. SIDS and Other Sleep-Related Infant Deaths: Evidence Base for 2016 Updated Recommendations for a Safe Infant Sleeping Environment. *Pediatrics.* 2016;138(5): e20162940

Baby Friendly USA The ten steps to successful breastfeeding: final report. East Sandwich; MA, Baby Friendly USA (2005)

KRAMER, M. S.; BARR, R. G.; DAGENAIS, S.; YANG, H.; JONES, P.; CIOFANI, L., *et al.* **Pacifier use, early weaning, and cry/fuss behavior: a randomized controlled trial** *JAMA*, 286 (3) (2001), pp. 322-326

KAKTI, A. A.; ALABDULLAH, A. S.; ALAHMED, A.; ALHOUAJJI, Z.; ALSWAILEM, E.; ALHASSAN, H. Prevalence of pacifier use and the impact of maternal education and regularity of dental visits on the age of pacifier withdrawal. *J Indian Soc Pedod Prev Dent* 2019;37:8-11

MACMILLAN, K. K.; LEWIS, A. J.; WATSON, S. T.; POWER, J.; GALBALLY, M. Maternal psychosocial predictors of pacifier use in a mother-infant interaction task: An observational study from the MPEWS pregnancy cohort, *Infant Behavior and Development*, Volume 61, 2020, 101505, ISSN 0163-6383 <https://doi.org/10.1016/j.infbeh.2020.101505>

ARNESTAD, M.; ANDERSEN, M.; ROGNUM, T. O. (1997). Is the use of dummy or carry-cot of importance for sudden infant death? *European Journal of Pediatrics*, 156, 968-970.

CLEMENTS, M. S.; MITCHELL, E. A.; WRIGHT, S. P.; ESMAIL, A.; JONES, D. R.; FORD, R. P. Influences on breastfeeding in southeast England. *Acta Paediatr.* 1997 Jan;86(1):51-6. doi: 10.1111/j.1651-2227.1997.tb08831.x. PMID: 9116426.

<https://www.pewresearch.org/global/2016/02/22/internet-access-growing-worldwide-but-remains-higher-in-advanced-economies/>

RIZZATO, V. L.; LOTTO, M.; CRUVINEL, T. (2021). Raw data of the manuscript: “Digital surveillance: The interests in toothache-related information after the outbreak of COVID-19”. *Figshare, Collection*. <https://doi.org/10.6084/m9.figshare.c.5428572.v2>Google Scholar

The World Health Organization (2021). <https://www.who.int/countries>

Paediatr Perinat Epidemiol . 2021 Jul;35(4):511-518. doi: 10.1111/ppe.12752. Epub 2021 Feb 11.
All day-long pacifier use and intelligence quotient in childhood: A birth cohort study

Nascer e Crescer - Birth and Growth Medical Journal 2020;29(1): 17-22.
doi:10.25753/BirthGrowthMJ.v29.i1.17978

Scudine KGO, Freitas CN, Nascimento-Moraes KSG, Bommarito S, Possobon RdF, Boni RC and Castelo PM (2021) Multidisciplinary Evaluation of Pacifier Removal on Oro-Dentofacial Structures: A Controlled Clinical Trial. (2021) *Front. Pediatr.* 9:703695. doi: 10.3389/fped.2021.703695