

Visualizing the Surge: Google Trends Analysis of Post-COVID Consumer Interest in Immunity-Boosting Herbal Beverages

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Abstract

The COVID-19 pandemic precipitated rapid shifts in consumer health behaviour, including heightened attention to immunity-enhancing foods and beverages. This short communication uses publicly available Google Trends data to quantify and visualize changes in public interest toward a set of herbal beverage terms before and after the onset of the pandemic. Monthly Google Trends data (Jan 2018 – Sept 2025) were retrieved for a targeted set of keywords covering broad terms, product-specific queries, and India-specific traditional terms. To enable cross-query comparability we included Vitamin C as an anchor term in every batch and applied anchor-based rescaling to all series. Pre-COVID (Jan 2018–Dec 2019) and post-COVID (Jan 2021–Dec 2021) average monthly interests were computed and compared; 2020 was treated as a transition year and excluded from pre/post averages. Results are shown as a normalized time series and percent change in mean interest. Several terms including Vitamin-C, Ashwagandha, Kadha, and Immune booster spiked around March–June 2020, coincident with the COVID-19 pandemic declaration and early national lockdowns. Quantitatively, many product, and culture-specific terms demonstrated substantial percent increases from pre- to post-COVID. Ashwagandha and Vitamin-C show particularly large increases; some lifestyle/product terms (Turmeric latte /Elderberry syrup) show smaller or transient changes. Google Trends shows a rapid and sustained increase in public interest for herbal, immunity-

related beverages after the pandemic onset. These signals are useful as a rapid, reproducible proxy of consumer intent and market interest, with implications for public health messaging, consumer safety surveillance, and prioritizing targeted clinical research.

Keywords: Google Trends, COVID-19, herbal beverages, ashwagandha, turmeric, immunity-boosting

Introduction

The COVID-19 pandemic, declared by the World Health Organization (WHO) in March 2020, not only represented a global health emergency but also profoundly disrupted social, economic, and consumer behaviour patterns (WHO, 2020; Lazer et al., 2014). One of the most visible changes was the heightened public awareness of immunity and the perceived need to support immune function through diet, lifestyle, and natural remedies. In the absence of immediate pharmaceutical solutions during the early months of the pandemic, many individuals turned to traditional knowledge, herbal beverages, and dietary supplements as accessible strategies to enhance resilience against infection.

Herbal beverages occupy a unique position at the intersection of nutrition, medicine, and culture. Across regions, longstanding traditions have prescribed plant-based decoctions, infusions, and tonics for promoting health and managing common ailments. In India, for example, *Kadha*—a traditional Ayurvedic preparation involving tulsi, black pepper, ginger, and other herbs—was officially promoted by the Ministry of AYUSH as a preventive health measure (Government of India, 2020). Similarly, turmeric milk (“golden latte”), elderberry syrup, and Ashwagandha teas gained global traction as perceived immunity boosters, amplified by media reports, wellness marketing, and social media influence. These practices illustrate how cultural traditions and globalized wellness trends converged during the crisis.

To capture such behavioural shifts, online search activity provides a powerful, real-time window into consumer intent. Google Trends has become an established tool in “infodemiology” — the study of how health-related information is sought and disseminated online (Eysenbach, 2009; Mavragani & Ochoa, 2019). Search data have been used to monitor infectious disease outbreaks (Nuti et al., 2014), assess mental health burden during crises (Amini-Rarani et al., 2024), and evaluate public engagement with preventive health measures. Compared with sales surveys or epidemiological reporting, Google Trends offers a

free, reproducible, and time-stamped proxy of public attention, making it especially useful in fast-evolving contexts like COVID-19.

Previous studies have outlined methodological frameworks to improve the reliability of Google Trends analyses, including the use of anchor terms to normalize heterogeneous queries (Lin et al., 2024). During 2020–2022, products such as Ashwagandha and turmeric/curcumin were frequently discussed in relation to immunity, some of which are supported by emerging preclinical or clinical evidence (Hewlings & Kalman, 2017; Tiralongo et al., 2016; Wieland et al., 2021). Elderberry preparations, for example, were associated with reductions in cold duration in controlled trials (Tiralongo et al., 2016), while turmeric and Ashwagandha have been reported to exhibit immunomodulatory effects (Hewlings & Kalman, 2017). At the same time, media amplification and consumer fear often produced transient surges in interest for products with limited evidence (Rovetta, 2021).

Understanding differential patterns of interest is important for public health communication, consumer safety surveillance, and prioritization of clinical research. By systematically quantifying search interest before and after the pandemic, this study contributes to documenting how a global health crisis accelerated both cultural and commercial uptake of herbal beverages. The findings also demonstrate how infodemiology tools such as Google Trends can complement traditional data sources to provide evidence-based insights into consumer behaviour.

The rationale for this approach is threefold. First, it contributes to the understanding of consumer behaviour during and after the pandemic, offering insights relevant for nutrition policy, marketing, and public health messaging. Second, it provides a reproducible methodological demonstration of how Google Trends can be harnessed to study functional foods and beverages — a domain of increasing importance in both academic research and industry. Third, it sheds light on how cultural traditions and modern wellness trends converged during a global crisis, shaping patterns of demand that may persist well into the post-pandemic era.

By combining descriptive time-series visualization with quantitative comparison of pre- and post-COVID periods, this study seeks to move beyond anecdotal reporting toward a more data-driven understanding of herbal beverage interest. Ultimately, these findings can inform future research, including clinical investigations into the efficacy and safety of widely searched herbal preparations, as well as targeted educational campaigns to guide safe and evidence-based consumer choices.

Methods

Data source and search terms

We used **Google Trends** (<https://trends.google.com>) to retrieve monthly relative search volume (RSV; 0–100) for selected keywords. Google Trends was chosen for accessibility, reproducibility, and its established role in infodemiology studies (Mavragani & Ochoa, 2019). Data were retrieved on 15 Sept 2025, following Google’s official guidelines for exporting and citing Trends data (Google LLC., Google Trends, 2025).

The following keyword clusters were defined (queried in separate batches; “Vitamin C” was included as an anchor in each batch):

- **Broad/ worldwide cluster:** Herbal tea (Worldwide), Green tea (Worldwide), Immune booster (Worldwide), Kadha (Worldwide), Vitamin C (Worldwide).
- **Product/worldwide cluster:** Turmeric latte (Worldwide), Golden milk (Worldwide), Ginger tea (Worldwide), Elderberry syrup (Worldwide), Vitamin C (Worldwide).
- **India / culture cluster:** Kadha (India), Ayurveda (India), Haldidoodh (India), Tulsi tea (India), Vitamin C (India).
- **Specific single term run:** Ashwagandha (Worldwide).

(Each Google Trends query is limited to 5 items; Vitamin C was used as the internal anchor to enable cross-batch normalization.) Exact query terms, retrieval dates, and raw CSV exports are provided in Supplementary Materials (or available upon request).

Timeframe

The analysis covers **January 2018 – September 2025** (monthly resolution). To assess changes in public interest surrounding the COVID-19 pandemic, we defined three time windows:

- **Pre-COVID:** January 2018 – December 2019
- **Transition year:** 2020 (excluded from mean calculations)
- **Post-COVID:** January 2021 – December 2021

This temporal segmentation is consistent with infodemiology practice, where transitional years are often treated separately to reduce confounding effects (Mavragani & Ochoa, 2019).

Normalization and anchoring (cross-query stitching)

Because Google Trends rescales values per query (0–100 relative to that batch’s maximum), direct comparisons across separate batches are not possible without adjustment. We therefore applied an **anchor-based normalization**:

For each batch, we identified the maximum observed value of the anchor term “Vitamin C.” Each series in that batch was multiplied by a scaling factor:

$$\text{Scaling Factor} = \frac{\text{Max}(\text{VitC_master})}{\text{Max}(\text{VitC_batch})}$$

where *Max (VitC_master)* is the anchor maximum from the primary “broad cluster” run. This procedure aligns all queries onto a common comparative frame, enabling valid cross-term analysis. Similar normalization approaches have been recommended in prior methodological studies (Mavragani & Ochoa, 2019; Cebrián & Domenech, 2022).

Any CSV cell containing the text “<1” was recoded as **0.5** for numeric processing, to preserve signal from very low search volumes without overstating their magnitude.

Data Preprocessing and Quality Control

To ensure data consistency and replicability, preprocessing steps were applied prior to analysis:

- **Data cleaning:** Removal of extraneous metadata, conversion of “<1” values to 0.5.
- **Imputation:** As Google Trends provides complete time series at monthly granularity, no missing values occurred beyond the “<1” case.
- **Smoothing:** A 3-month moving average was applied to reduce short-term noise while preserving long-term trends.
- **Batch consistency:** Queries were repeated at different times to assess sampling variability, as prior reports note that Google Trends may introduce small fluctuations between downloads (Cebrián & Domenech, 2022; Lazer et al., 2014).

Exact preprocessing scripts and the master Excel file containing normalized, stitched series are available on request, consistent with reproducibility best practices in infodemiology (Lin et al., 2024).

Analysis

Normalized monthly time series were plotted, with March 2020 (WHO pandemic declaration) marked as a vertical dashed line in Figure 1. For quantitative comparisons, we computed the **mean monthly RSV per term** in the pre- and post-COVID windows and calculated percentage change as:

$$\% \text{ Change} = \frac{\text{PostMean} - \text{PreMean}}{\text{PreMean}} \times 100$$

Results are summarized in **Table 1** and **Figure 2**.

Reproducibility Considerations

We followed recommended steps to reduce potential Google Trends artefacts:

1. Use of synonyms and culturally specific variants where relevant.
2. Stable, consistent time windows.
3. Documentation of exact query strings, dates, and export format.
4. Inspection for sampling variability across repeated downloads.

These steps are consistent with published methodological guidelines for improving transparency and reproducibility in Google Trends research (Mavragani & Ochoa, 2019; Lin et al., 2024).

Results

Time series overview (Figure 1)

Figure 1 displays normalized monthly Google Trends series for all selected terms (Jan 2018 – Sept 2025). Distinct patterns emerge:

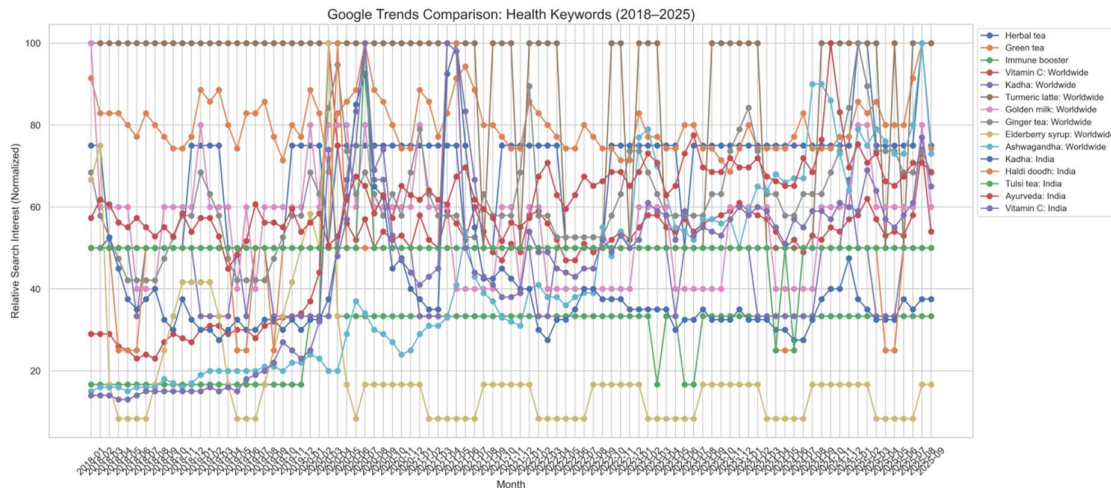


Figure 1. Normalized monthly Google Trends search interest (Jan 2018 – Sept 2025) for immunity-related herbal and nutritional terms. Vertical dashed line marks March 2020 (WHO pandemic declaration). Data reveal pandemic-aligned spikes (notably for Vitamin C, Ayurveda, and Kadha), long-term structural growth (Ashwagandha), and transient pandemic-related fads (Elderberry syrup, Golden milk).

- Pandemic-aligned spikes (Mar–Jun 2020):** Several terms, including *Immune booster*, *Vitamin C* (both India and Worldwide anchors), *Kadha* (India), and *Ayurveda* (India), showed sharp surges coinciding with the initial COVID-19 outbreak and subsequent lockdowns. This aligns with documented infodemiology spikes in health-related queries during early 2020 (Mavragani & Ochoa, 2019; Lin et al., 2024).
- Sustained growth:** *Ashwagandha* (Worldwide) exhibited a strong and persistent elevation in interest beyond the immediate pandemic phase, extending through 2022–2025, indicating a structural shift in consumer demand for herbal adaptogens.
- Transient or declining interest:** Niche products such as *Elderberry syrup*, *Turmeric latte*, and *Golden milk* displayed only temporary surges in 2020 (Lazer et al., 2014), followed by stagnation or decline, suggesting short-lived “fad” dynamics.
- Baseline differences:** Common terms such as *Green tea* and *Vitamin C* showed high baseline popularity, while culturally specific Indian terms (*Kadha*, *Haldiroodh*, *Tulsi tea*) exhibited pronounced but geographically localized spikes, reflecting both global and cultural heterogeneity in consumer awareness.

Percent-change quantification (Table 1; Figure 2)

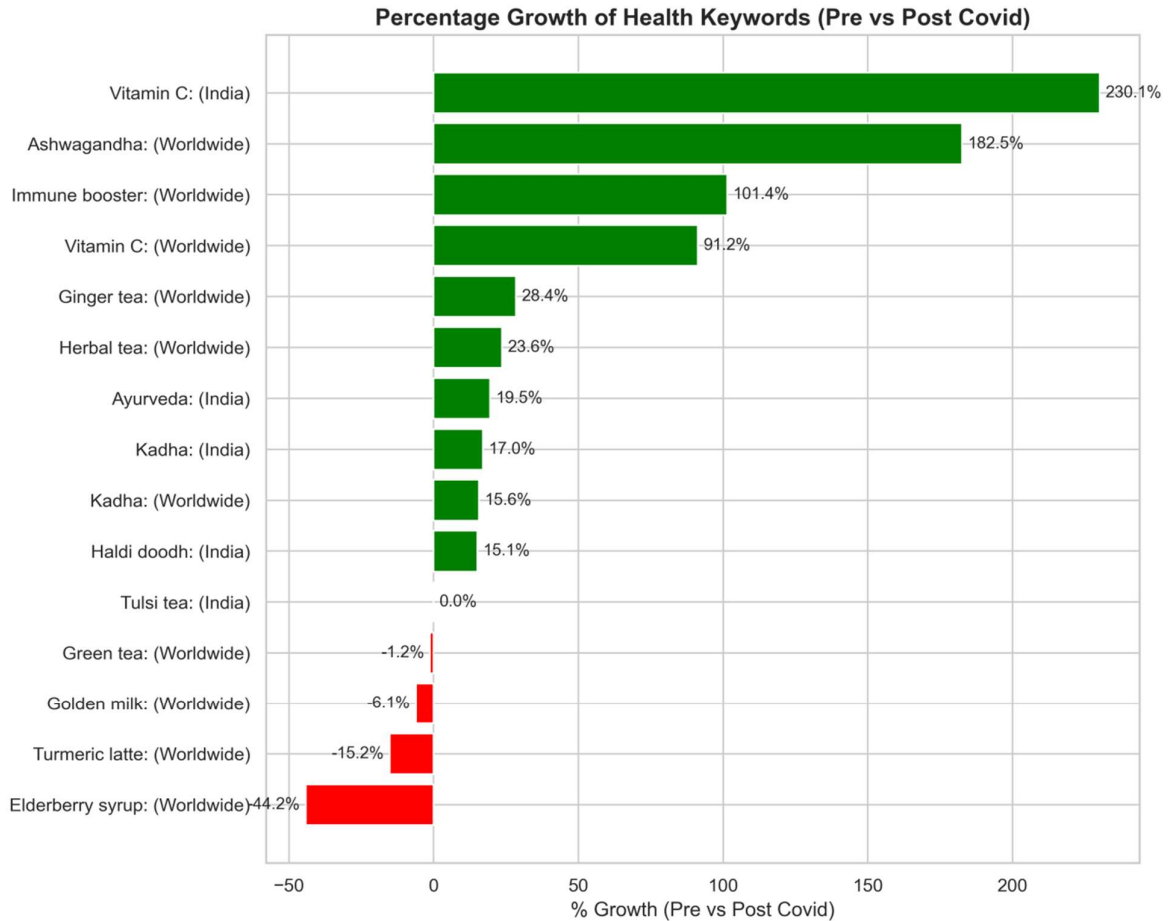
Table 1 summarizes mean monthly search volumes pre- and post-COVID and associated percent growth. Figure 2 visualizes percent change to highlight relative magnitude across terms.

Table 1. Percent change values by keyword (Pre- vs Post-COVID).

Keyword	Pre-COVID avg	Post-COVID avg	% Growth
Vitamin C (India)	16.8	55.4	230.1
Ashwagandha (Worldwide)	18.3	51.7	182.5
Immune booster (Worldwide)	0.5	1.0	101.4
Vitamin C (Worldwide)	28.8	55.1	91.2
Ginger tea (Worldwide)	9.8	12.5	28.4
Herbal tea (Worldwide)	2.3	2.9	23.6
Ayurveda (India)	49.3	59.0	19.5
Kadha (India)	14.1	16.5	17.0
Kadha (Worldwide)	2.6	3.0	15.6
Haldidoodh (India)	0.9	1.0	15.1
Tulsi tea (India)	1.0	1.0	0.0
Green tea (Worldwide)	28.3	27.9	-1.2
Golden milk (Worldwide)	2.9	2.7	-6.1
Turmeric latte (Worldwide)	1.0	0.8	-15.2
Elderberry syrup (Worldwide)	3.4	1.9	-44.2

Table 1. Pre- and post-COVID mean monthly search volumes (normalized) and percent growth for immunity-related terms. Vitamin C (India) and Ashwagandha (Worldwide) demonstrated the largest increases, while Elderberry syrup and Turmeric latte showed marked declines, suggesting differential long-term retention of pandemic-driven interest.

Figure 2: Percent change in mean monthly interest (Pre- vs. Post-COVID, normalized) for product-specific herbal beverage terms.



Key results:

- *Vitamin C (India)* demonstrated the strongest relative increase (+230%), reflecting its widespread recognition as an accessible immune-support supplement.
- *Ashwagandha (Worldwide)* showed a substantial increase (+183%), highlighting growing global interest in adaptogens.
- Moderate but significant increases were seen for *Ayurveda (India)* (+19.5%) and *Kadha (India)* (+17.0%), underscoring the role of cultural remedies.
- *Immune booster (Worldwide)* nearly doubled in relative interest, though from a low baseline, suggesting a broadening of consumer vocabulary around immunity.
- In contrast, *Green tea* (-1.2%), *Golden milk* (-6.1%), and *Elderberry syrup* (-44.2%) declined, consistent with waning novelty or limited mainstream adoption.

- Several niche beverages (*Elderberry syrup, Golden milk, Turmeric latte*) declined post-pandemic, showing selective fading of early fads.

These findings support the view that COVID-19 triggered both enduring shifts (e.g., adaptogen adoption) and ephemeral spikes (e.g., elderberry syrup) in global consumer behavior.

Comparative visualization (Figure 3)

The dumbbell plot (Figure 3) illustrates pre- vs post-COVID shifts for all terms.

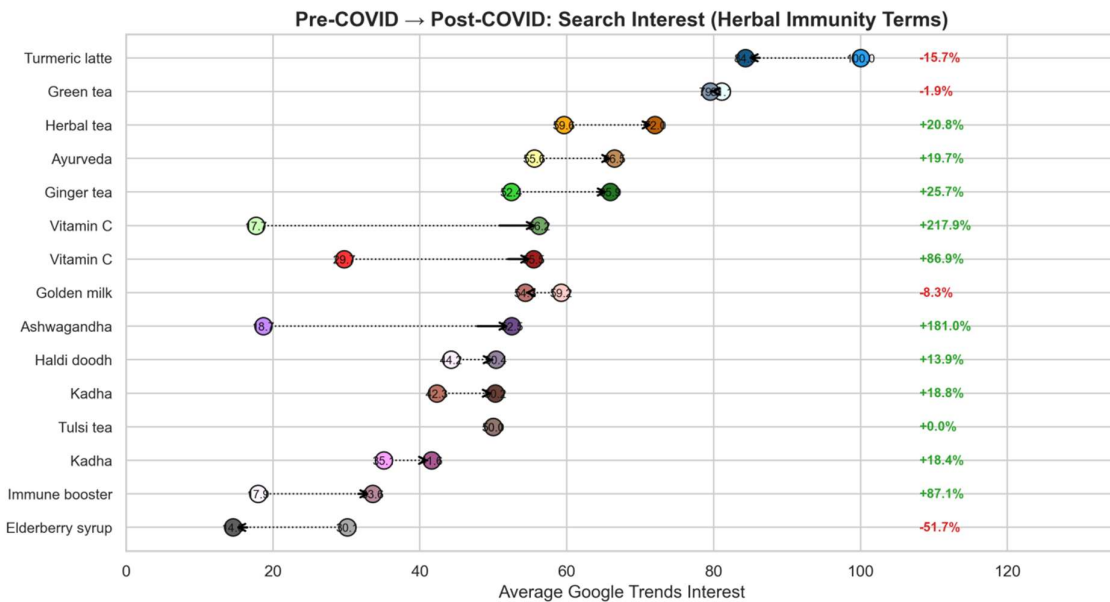


Figure 3. Dumbbell plot of pre- vs post-COVID Google Trends search interest for herbal/nutritional immune boosters. Strong gains (*Vitamin C, Ashwagandha*) contrast with declines in niche products (*Elderberry syrup, Turmeric latte*), highlighting how the pandemic reshaped global consumer interest in immune health differently across cultural and commercial domains.

1. **Dominant growth drivers:** *Vitamin C (India)* and *Ashwagandha (Worldwide)* were the most dynamic terms, indicating parallel reliance on both micronutrient supplementation and traditional herbal medicine during and after the pandemic.
2. **Moderate but persistent terms:** *Ayurveda, Kadha,* and *Ginger tea* sustained post-pandemic interest, suggesting lasting integration into daily routines rather than short-term surges.

3. **Regional differentiation:** Indian cultural remedies (*Kadha*, *Haldidoodh*, *Tulsi tea*) exhibited sharp but geographically bounded spikes, while globally marketed terms (*Green tea*, *Golden milk*) showed broader but less pronounced changes.
4. **Declining trends:** The fall in *Elderberry syrup* searches illustrates a fading global trend despite early pandemic popularity, consistent with reports that consumer health searches can overestimate real-world uptake (Lazer et al., 2014; Nuti et al., 2014).

Interpretation and implications

The results indicate that the COVID-19 pandemic acted as both a catalyst and a filter for health-seeking behaviors. While it generated short-term spikes in searches for many immune-related remedies, only a subset—particularly *Ashwagandha* and *Vitamin C*—exhibited sustained post-pandemic interest, suggesting long-term adoption. In contrast, niche or trend-driven products such as *Elderberry syrup* and *Turmeric latte* showed transient increases that later declined. The divergence between culturally localized remedies (*Kadha*, *Haldidoodh*) and globally marketed adaptogens (*Ashwagandha*) underscores the interplay between regional health traditions and the globalization of herbal medicine markets. These findings align with prior infodemiology studies demonstrating that pandemic-driven search interest does not uniformly translate into persistent consumer behavior (Nuti et al., 2014; Lazer et al., 2014; Mavragani & Ochoa, 2019; Lin et al., 2024).

Discussion

Principal findings

Our Google Trends analysis documents a marked and temporally aligned increase in search interest for immunity-related and herbal beverage terms following the onset of the COVID-19 pandemic. The March–June 2020 spikes, observed across multiple queries and regions, coincide with the early pandemic shock and widespread public health uncertainty. Several product-specific and culturally specific terms retained elevated interest after 2020, notably *Ashwagandha* and India-specific traditional remedies (*Kadha*, *Ayurveda*, *Haldidoodh*), whereas other terms (e.g., *Elderberry syrup*, *Turmeric latte*) displayed only transient increases (Table 1; Figures 1–2).

Interpretation and context

Search volumes are an indirect measure of public attention and intent, reflecting information-seeking behavior, purchase consideration, media influence, and, at times, symptom queries. Google Trends has been widely used in health infodemiology for rapid surveillance and

hypothesis generation (Mavragani& Ochoa, 2019; Lin et al., 2024; Nuti et al., 2014). Our anchor-based normalization provides a transparent method to compare separately queried terms; however, it assumes that the anchor behaves consistently across batches and should be interpreted as an approximation (Mavragani& Ochoa, 2019; Cebrián& Domenech, 2022).

The pronounced early 2020 increase for Vitamin C aligns with contemporaneous public messaging and media coverage about immunity and vitamin supplementation (Lin et al., 2024). The sustained rise in Ashwagandha interest suggests longer-term adoption of certain adaptogenic herbs into daily wellness routines. Similarly, India-specific surges highlight the importance of cultural context in shaping health information-seeking behavior and the adoption of traditional remedies. These observations reflect both the globalization of herbal medicine and the persistence of regionally grounded health practices (Nuti et al., 2014; Mavragani & Ochoa, 2019).

Public health, regulatory and research implications

- **Public messaging:** Persistent consumer interest in botanicals underscores the need for clear, evidence-based guidance on efficacy, dosing, interactions, and safety. Where adoption outpaces clinical evidence, health agencies should provide accessible guidance and myth-busting communications (Wieland et al., 2021; Hawkins et al., 2019; Office of Dietary Supplements - NIH, 2025).
- **Market surveillance & product safety:** Growing demand can incentivize rapid product development and opportunistic claims. Regulatory agencies should monitor labeling, adulteration risks, and adverse event signals, especially for concentrated extracts and multi-ingredient formulations.
- **Clinical research priorities:** The gap between consumer behavior and robust clinical evidence argues for pragmatic randomized trials, observational cohort studies, and pharmacoepidemiologic surveillance focusing on the most widely used botanicals (e.g., curcumin/turmeric, Ashwagandha, elderberry) (Hewlings& Kalman, 2017).

Methodological caveats and limitations

- **Search intent ambiguity:** Google Trends cannot disambiguate the reason for a search (e.g., purchase intent vs curiosity vs symptom).
- **Data quality & sampling variability:** Google Trends uses sampling and privacy thresholds that may introduce zeros or day-to-day variability; prior methodological

work cautions careful repeated downloads and documented methods (Cebrián & Domenech , 2022) (Lazer, David et al., 2014).

- **Normalization approximation:** Anchor scaling is a practical stitching approach but is approximate; more sophisticated programmatic stitching with overlapping windows (pytrends) can refine scaling for exhaustive studies (Mavragani & Ochoa, 2019).
- **Coverage bias:** Trends captures internet users and will underrepresent low-internet regions or demographics less likely to search online. Cultural differences in terminology also affect visibility (e.g., "Kadha" vs "herbal decoction").
- **Consumption vs interest:** Elevated interest is not proof of increased consumption or of health benefit — triangulation with sales data, survey data, or registry/pharmacy records would strengthen claims.
- **Media confounding:** A spike could be driven by a specific viral news story or celebrity endorsement, not solely broader public health interest.

Despite these limitations, the approach provides a transparent, reproducible and rapid indicator of shifting consumer attention that is useful for prioritizing surveillance, research and regulatory attention.

Conclusion

Google Trends reveals a measurable, pandemic-aligned surge and partial persistence in public interest for herbal and immunity-related beverages. These signals point to enduring shifts in consumer priorities and demand that warrant responsive public health communication, regulatory surveillance, and targeted clinical research to ensure safe and evidence-based use.

Data availability

Google Trends CSV exports and the normalization workbook (Excel) used in this current study are available from the corresponding author on reasonable request.. Exact Google Trends query strings and the CSV download date (15-Sep-2025) are provided with the supplementary materials.

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