Analyzing Inflation Dynamics in Canada During and After the COVID-19 Pandemic: A Deep Dive into Consumer Price Index Movements from 2019 to 2023*

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The COVID-19 pandemic has left a significant imprint on global economic structures, influencing inflation rates worldwide. Canada, like many countries, experienced fluctuating inflation rates during and post-pandemic, marking a period of economic instability and adjustment. This paper delves into the inflation dynamics in Canada from 2019 to 2023, with a special focus on the consumer price index (CPI) as a reflection of the cost of goods and services impacting the everyday lives of Canadians. It explores the trajectory of the overall inflation rate, which peaked in 2023, highlighting the role of various sectors, including food, housing, and energy, in driving these trends. By analyzing data from Statistics Canada, this study provides insights into how the pandemic and subsequent recovery phases have affected inflation. It examines the interplay between supply chain disruptions, monetary policy responses, and changes in consumer behavior, culminating in a comprehensive overview of inflation's impact on the Canadian economy. This analysis not only sheds light on the inflationary trends but also contributes to understanding the broader economic implications of the COVID-19 pandemic on Canada.

Table of contents

*The GitHub repository: https://github.com/qinheinfo/Canada_inflation

1 Introduction

The decision to analyze Canadian inflation during the COVID-19 pandemic was prompted by the significant economic disturbances observed globally. As a G7 nation with a prominent economic footprint, Canada offers a nuanced perspective on the complexities of inflation during times of crisis. The Consumer Price Index (CPI), a critical economic indicator, measures the average change over time in the prices paid by urban consumers for a standard basket of goods and services (*Consumer Price Index (CPI): What It Is and How It's Used* n.d.). The CPI is instrumental in shaping economic policies, such as adjustments to interest rates, wages, and social benefits, which in turn directly influence the everyday economic experiences of individuals (*What Is the Consumer Price Index and Why Is It Important?* n.d.).

Amidst the pandemic and subsequent global events like the war in Ukraine, consumer prices have been significantly impacted. Canadians have grappled with rising costs in many aspects of their daily lives due to supply chain disruptions, oil price volatility, and shifts in consumer demand. The CPI, Statistics Canada's primary measure of inflation, has captured these extraordinary impacts, with inflation rates reaching four-decade highs in 2022. (*Consumer Price Index Fact Check: Measuring Inflation During the COVID-19 Pandemic and Beyond* n.d.)

This paper explores the relationship between the CPI values of specific product categories and the all-items CPI. Utilizing data from Statistics Canada, it examines the cost trajectory from 2019 to 2023 for commonly purchased items in grocery stores across categories such as food, household goods, clothing, gasoline, healthcare, and recreation. By analyzing the increases in CPI values for these items, this research aims to identify potential correlations between specific cost fluctuations and broader inflation trends. This analysis enhances our understanding of how inflation impacts the Canadian economy, shedding light on the dynamic interplay between individual spending categories and overall economic conditions. (*Consumer Price Index, Annual Average, Not Seasonally Adjusted1, 2, 3* n.d.)

2 Data

2.1 Measurement

The data used in this paper comes from Statistics Canada's Consumer Price Index (CPI), Prices for the CPI are collected across a variety of geographic locations and from a selection of goods and services representative of Canadian consumer spending. The data collection targets urban and rural private households, excluding specific demographics such as those residing in collective households or on Indian reserves. Price collectors employ a detailed specification approach to ensure consistency in the quality and type of goods and services priced (*Consumer Price Index* n.d.).

Sampling for the CPI is carefully designed to reflect the relative importance of each item in the total expenditures of consumers. A mix of probability and non-probability sampling techniques is employed to select a diverse and representative set of retail outlets and goods. Prices are typically collected during the first two weeks of each reference month, with some variations depending on the nature of the goods or services.

The CPI data are gathered from direct survey responses, administrative records, and other relevant Statistics Canada surveys. This multimodal collection ensures a comprehensive capture of price movements across the selected basket items. Prices are collected monthly, quarterly, semi-annually, or annually based on the nature of the goods or services, with food prices often collected into the third week of the month.

2.2 Dataset

The Dataset were derived from Statistics Canada's Consumer Price Index (CPI), capturing key statistics on Canadian Consumaer Price Index Value of different items encompassing from 2019 to 2023.

Table 1 shows the first 5 rows in the dataset, REF_DATE stands for the time that the data was gathered, products_and_product_groups stands for items category, value stands for CPI value.

Table 1: First 5 Rows in Mental Health Indicators Dataset

ref_date	products_and_product_groups	value
2019	All-items	136.0
2020	All-items	137.0
2021	All-items	141.6
2022	All-items	151.2
2023	All-items	157.1

2.3 Data Analysis

To analyze the data , I worked on R (R Core Team 2022), using the tidyverse (Wickham et al. 2019), (Richardson et al. 2024), and gitcreds (**gitcreds?**) packages. Tables in the report were created with kableExtra (Zhu 2021) and figures were created with ggplot2 which was built in tidyverse (Wickham et al. 2019).

This paper utilizes data from Statistics Canada's Consumer Price Index (CPI), focusing on a subset of six variables that represent diverse categories of consumer spending: food, household essentials, clothing, gasoline, healthcare, and recreation. These categories were carefully selected to encompass a broad spectrum of goods and services, providing a comprehensive

sight of consumer price changes during significant economic periods. The analysis covers the period from 2019 to 2023, a timeline strategically chosen to encompass the main phases of the COVID-19 pandemic as well as the subsequent post-pandemic economic environment.

3 Results

3.1 Food

Figure 1 illustrates the trajectory of both the Food Value and the All-items Value over a five-year span, from 2019 to 2023. A stark contrast is evident in the divergence of these two lines post-2020, potentially indicative of the varying impact of the pandemic on food prices compared to general inflation. The steeper gradient of the Food curve suggests an amplified reaction to pandemic-related factors, which may include disruptions in the supply chain, changes in consumer demand, and perhaps shifts in agricultural productivity.

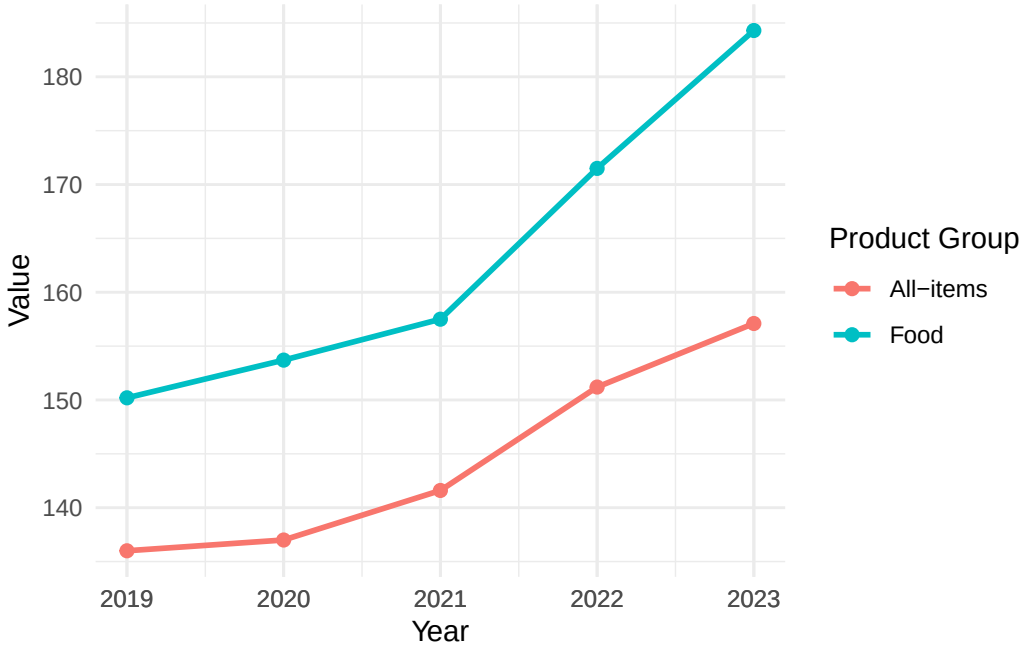

Figure 1: Comparison of Food Value and All-items Value Over Time

Table 2 offers a numerical perspective on the trends highlighted in Figure 1, providing the exact annual values that reflect the differential inflation rates for Food and All-items. It is clear from the table that the Food Value consistently increased at a higher rate than the All-items Value each consecutive year. Notably, between 2022 and 2023, the Food Value rose from 171.5 to 184.3, while the All-items Value exhibited a more moderate climb from 151.2 to

157.1. This quantifiable data underscores the disproportionate inflationary pressures on food items.

Table 2: Comparison of Food Value and All-items Value Over Time

Year	Food Value	All-items Value
2019	150.2	136.0
2020	153.7	137.0
2021	157.5	141.6
2022	171.5	151.2
2023	184.3	157.1

both Figure 1 and Table 2 reveal that food-related inflation has outstripped the general inflation rate during the period analyzed. This divergence is most pronounced in the later years, notably between 2022 and 2023, suggesting that while the general cost of living increased during the pandemic, the cost of food increased even more markedly. These findings could have implications for economic policy, as they underscore the need to address the specific drivers of food inflation in the context of the pandemic's broader economic impact.

3.2 Household operations, furnishings and equipment

In Figure 2 depicts a comparative analysis specifically focusing on the Household Value, relative to the All-items Value, over a period from 2019 to 2023. The value associated with Household operations, furnishings, and equipment shows a gradual increase over the five-year span. The progression is steady from 2019 to 2021, followed by a more noticeable rise from 2021 to 2023. This suggests a delayed but eventual response to inflationary pressures within the household sector during and post the pandemic period. The consistency in the upward trajectory, however, does not match the sharp incline observed in the All-items Value, especially from 2021 onwards.

Table 3 supports the observations from the graph by providing the exact figures for the Household Value. With a modest rise from 123.6 in 2019 to 132.0 in 2023, the increase in household-related costs is apparent, yet not as drastic as the general inflation trend. The year-to-year change remains relatively ,moderate, with the most significant jump observed between 2021 and 2022, suggesting a particular period where inflation hit household items more significantly compared to the preceding years.

Table 3: Comparison of Household Value and All-items Value Over Time

Year	Household Value	All-items Value
2019	123.6	136.0

Table 3: Comparison of Household Value and All-items Value Over Time

Year	Household Value	All-items Value
2020	123.8	137.0
2021	125.2	141.6
2022	130.9	151.2
2023	132.0	157.1

In light of the inflation dynamics in Canada during and after the COVID-19 pandemic, the Household Value data illustrates that this category has experienced inflation, but not to the extreme extents seen in the aggregate of all items. This could indicate that household operations, furnishings, and equipment were subjected to different economic forces or benefited from factors that mitigated more extreme price increases, such as alternative supply chains, less volatile demand, or different pricing strategies within the sector.

3.3 Clothing and footwear

In Figure 3, the line graph showcases the 'Clothing and footwear' value relative to the 'All-items' value over a five-year period, from 2019 to 2023. The 'Clothing and footwear' line remains remarkably flat, indicating that the value has not significantly increased over time. This stability suggests that clothing and footwear were less affected by inflationary pressures compared to the average of all consumer goods and services, which is depicted by the rising 'All-items' line.

Delving into the numerical details provided in Table 4, we see that the Clothing Value begins at 96.1 in 2019 and shows a slight decrease until 2021, where it reaches its lowest at 94.1. This could indicate a reduced demand for clothing and footwear during the peak periods of the COVID-19 pandemic, possibly due to lockdowns and shifts in consumer spending towards essentials. However, by 2023, the Clothing Value modestly increases to 96.4, suggesting a slow return towards pre-pandemic levels.

Table 4: Comparison of Clothing Value and All-items Value Over Time

Year	Clothing Value	All-items Value
2019	96.1	136.0
2020	94.4	137.0
2021	94.1	141.6
2022	95.4	151.2
2023	96.4	157.1

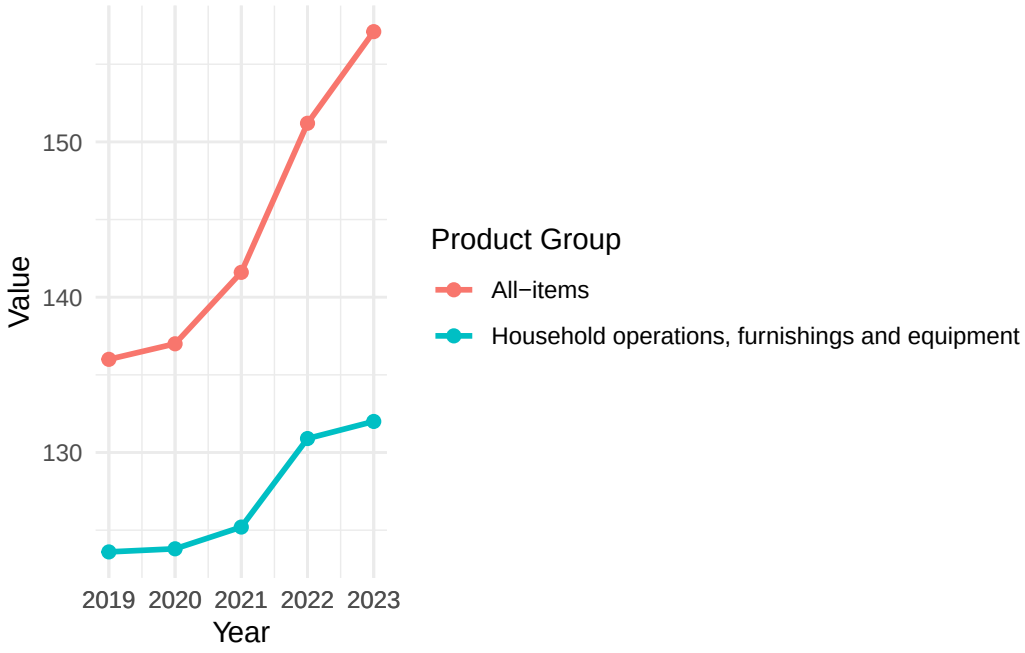

Figure 2: Comparison of Household Value and All-items Value Over Time

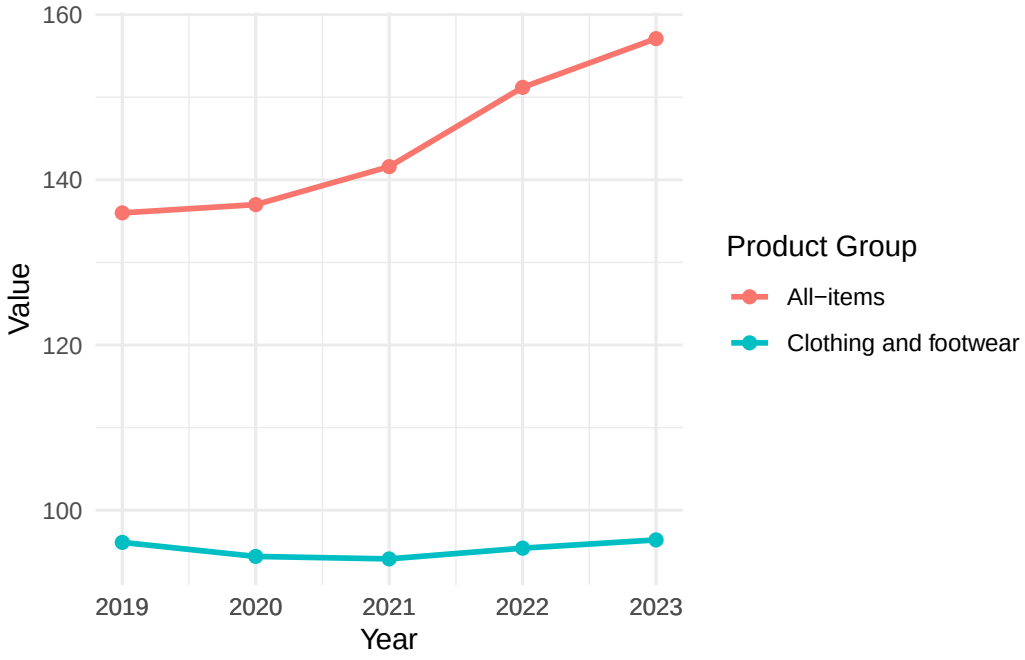

Figure 3: Comparison of Clothing Value and All-items Value Over Time

The juxtaposition of the flat trend for Clothing and Footwear against the rising trend of the All-items Value highlights a distinct economic behavior within the clothing sector. This sector appears to have been shielded from the inflation that affected other sectors more broadly. Possible reasons for this could include a decrease in consumer spending on fashion and discretionary items during the pandemic, shifts in retail and e-commerce strategies, or an oversupply in the market.

3.4 Gasoline

Figure 4 presents a line graph comparing the Gasoline Value to the All-items Value from 2019 to 2023. The Gasoline line shows a significant and volatile shift over the period, with a notable dip in 2020 followed by a sharp increase through to 2022. This volatility is contrasted against the more gradual upward trend of the All-items Value.

The steep decrease in Gasoline Value in 2020 aligns with the global reduction in oil prices and travel activity during the early stages of the COVID-19 pandemic. However, the subsequent sharp rise through 2021 and into 2022 might reflect the resurgence in travel demand, combined with fluctuations in oil production and supply chain issues, leading to a spike in gasoline prices that outpaces the general inflation rate.

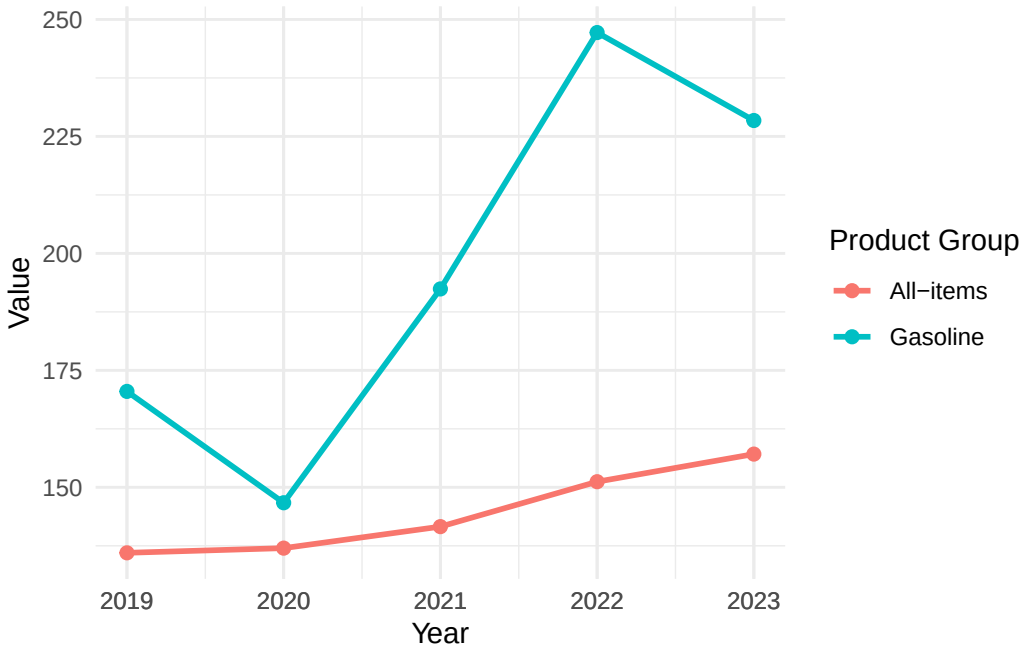

Figure 4: Comparison of Gasoline Value and All-items Value Over Time

Table 5 supports the graphical data by providing the exact figures for both Gasoline and All-items Values. Starting at 170.5 in 2019, the Gasoline Value decreases to 146.7 in 2020. The

year 2021 marks the beginning of a steep climb to 192.4, continuing to a peak at 247.2 in 2022 before a slight retreat to 228.4 in 2023. The All-items Value, in comparison, rises steadily from 136.0 in 2019 to 157.1 in 2023, without the same level of fluctuation seen in gasoline prices.

Table 5: Comparison of Gasoline Value and All-items Value Over Time

Year	Gasoline Value	All-items Value
2019	170.5	136.0
2020	146.7	137.0
2021	192.4	141.6
2022	247.2	151.2
2023	228.4	157.1

Gasoline prices experienced significant fluctuations, with a dramatic increase that far exceeds the inflation trend of other consumer goods and services. The sharp rise in gasoline prices could have a cascading effect on the broader economy due to the essential nature of fuel in transportation and logistics, potentially contributing to the inflation of other items. The trend in gasoline prices is indicative of the unique economic pressures faced in the energy sector, including the impact of global events on oil markets and the transition to alternative energy sources.

3.5 Health and personal care

Figure 5 displays the value of 'Health and personal care' relative to the 'All-items' value over the span of 2019 to 2023. The line for 'Health and personal care' exhibits a steady upward trend, though at a slower rate than the 'All-items' value. The growth in the health sector is consistent, which could suggest ongoing inflationary pressures in health-related goods and services, but it is not as steep as the overall inflation.

The numerical data in Table 6 offers a clearer picture of this trend. Starting at a value of 127.4 in 2019, 'Health and personal care' experiences a moderate increase each year, reaching 145.8 in 2023. The annual growth is steady without any significant spikes, indicating that while there has been inflation within the healthcare sector, it has been relatively controlled and predictable.

Table 6: Comparison of Healthcare Value and All-items Value Over Time

Year	Healthcare Value	All-items Value
2019	127.4	136.0
2020	129.2	137.0
2021	132.6	141.6

Table 6: Comparison of Healthcare Value and All-items Value Over Time

Year	Healthcare Value	All-items Value
2022	138.0	151.2
2023	145.8	157.1

This data may point to the fact that despite the overall economic turbulence experienced during the COVID-19 pandemic, the health and personal care sector has not inflated to the same extent as the aggregate of all items. It may also reflect the essential status of healthcare, which could lead to more stable pricing regardless of broader economic conditions. The relative stability in health and personal care costs could be critical for policy discussions around healthcare affordability and accessibility during times of economic stress.

3.6 Recreation, education and reading

In Figure 6, the trend for 'Recreation, education, and reading' demonstrates a gradual yet consistent upward movement over the years 2019 to 2023. It shows a steady increase in value, albeit not as steep as the 'All-items' category, which experiences a more pronounced rise during the same period. This suggests that while general inflation has been rising, the costs within the recreation and education sectors have been increasing at a comparatively milder rate.

Table 7 offers a year-by-year comparison of the values for 'Recreation, education, and reading' against the 'All-items' values. Beginning in 2019, the value for recreation and education starts at 116.8, dips slightly to 115.7 in 2020, and then gradually increases to 117.9 in 2021. This slight decrease followed by an increase could be indicative of the initial impact of the pandemic, with subsequent adaptation and recovery in the sector. Moving into 2022 and 2023, the values continue to rise to 123.5 and 126.4, respectively, underscoring a continued but moderate growth in contrast to the more significant inflationary trend seen across the broad spectrum of consumer goods and services, where the 'All-items' value moves from 136.0 in 2019 to 157.1 in 2023.

Table 7: Comparison of Recreation, education and reading Value and All-items Value Over Time

Year	Recreation, education and reading Value	All-items Value
2019	116.8	136.0
2020	115.7	137.0
2021	117.9	141.6
2022	123.5	151.2
2023	126.4	157.1

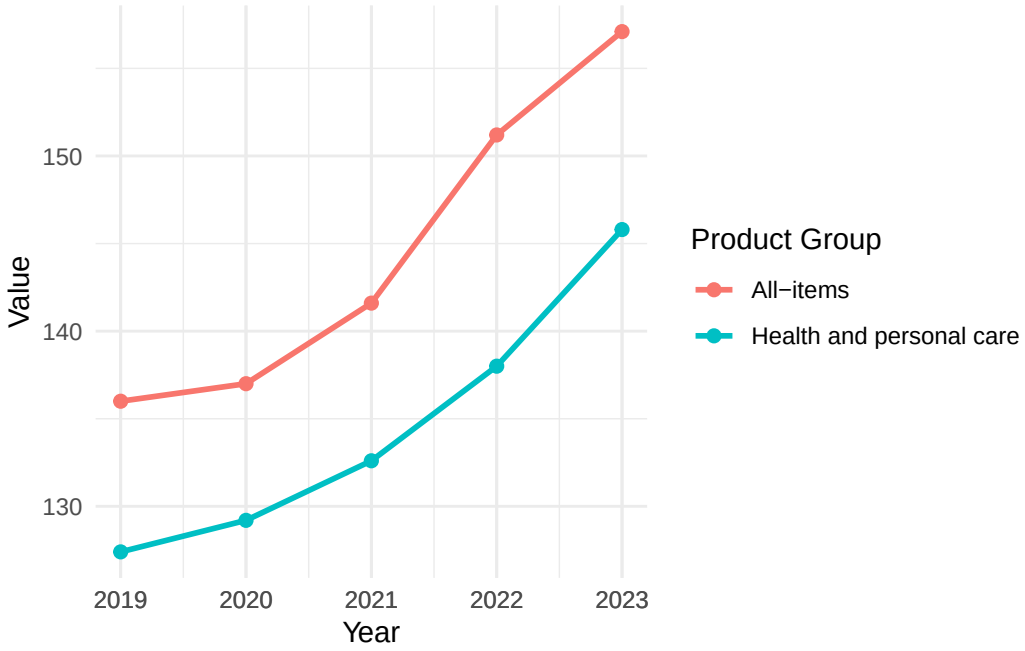

Figure 5: Comparison of Healthcare Value and All-items Value Over Time

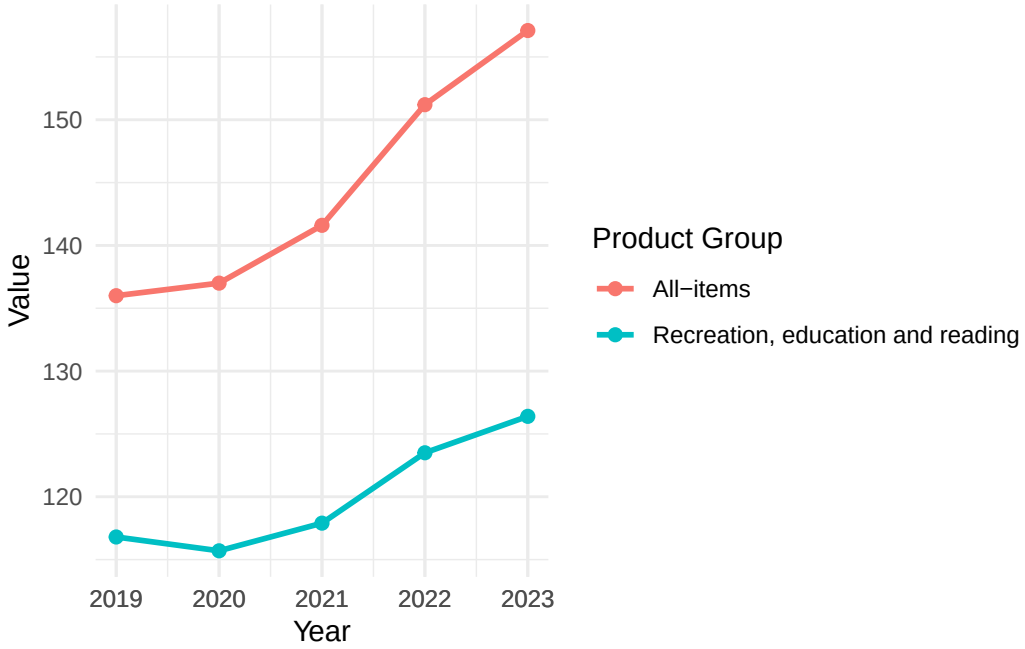

Figure 6: Comparison of Recreation, education and reading Value and All-items Value Over Time

Recreation, education, and reading sector saw an overall increase in value throughout the five-year period, although at a pace that was slower than the overall increase in consumer prices. The resilience of this sector's value, rising despite the economic challenges of the pandemic, may suggest a robust demand for recreational, educational, and reading products and services. Additionally, it could reflect the impact of digital alternatives and online services that became more prevalent during the pandemic, potentially offsetting higher costs or changes in consumer behavior as individuals and families sought at-home entertainment and learning options.

4 Discussion

4.1 Summary

The overall CPI rose steadily from 2019 to 2023, peaking in 2022, indicative of broad economic pressures. This general trend highlights the pervasive impact of the pandemic across all sectors, though the intensity of the impact varied. The analysis underscores the complex interplay between supply chain disruptions, altered consumer behaviors, and inflationary expectations, which collectively influenced the trajectory of price changes.

The varied responses across sectors suggest differential resilience and vulnerability to economic shocks. For example, the sharp rise in food prices not only reflects supply chain issues but also changes in consumer preferences and possible speculative behaviors. Similarly, the fluctuations in gasoline prices highlight the external dependency on global markets, which can rapidly transmit economic shocks into domestic inflation.

4.2 Limitations

The primary constraint is the reliance on CPI data, which, despite its comprehensive nature, may not capture the granular impacts of economic policies, consumer sentiment, or unrecorded market activities. Moreover, the analysis period, though strategically chosen to cover the main phases of the pandemic, does not allow for the examination of long-term economic impacts, which may become more apparent in subsequent years (*Resilient Global Economy Still Limping Along, with Growing Divergences* n.d.).

4.3 Future Directions

Future research should aim to address these limitations by incorporating more diverse data sources, such as consumer surveys or micro-level transaction data, to provide a deeper understanding of individual and sector-specific economic behaviors (*Estimating Consumer Price Inflation by Household* n.d.). Longitudinal studies extending beyond the immediate aftermath

of the pandemic could offer insights into the lasting effects of such a global crisis on consumer price indices (*Resilient Global Economy Still Limping Along, with Growing Divergences* n.d.).

Additionally, comparative studies involving multiple countries could enhance the robustness of the findings, allowing for a broader evaluation of CPI dynamics in different economic systems and stages of recovery (*Consumer Price Index (CPI) - Country / Jurisdiction List* n.d.). Exploring the impact of specific government interventions or policy changes on the CPI could also yield valuable insights into effective strategies for managing inflation in crisis situations.

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