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A STUDY ON LINKAGE BETWEEN OIL PRICE, TRADE OPENNESS, CLIMATE VAIRIABILITY AND FOOD INFLATION IN INDIA WITH SPECIAL REFERENCE TO INDIAN OIL CORPORATION LTD

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Abstract

This study investigates the complex relationships between oil price, trade openness, climate variability, and food inflation in India. Using econometric techniques, we examine the impacts of oil price shocks, trade liberalization, and climate variability on food inflation in India.

Our findings suggest that oil price shocks and climate variability significantly contribute to food inflation, while trade openness plays a crucial role in mitigating these effects.

The study highlights the importance of policymakers considering these factors when implementing policies to manage food inflation and ensure food security in India. The research contributes to the ongoing debate on the interlinkages between energy, trade, climate, and food security, providing valuable insights for policymakers and researchers alike.

Key words: Oil Price, Climate Variability, Food Inflation, Chi square test.

Introduction

In the complex landscape of economic dynamics, the interplay between various factors often shapes the growth of nation’s development. In India, a country with a growing economy and diverse demographic, understanding the intricate relationship between oil prices, trade openness, climate variability, and food inflation is imperative. These factors are not only interconnected but also exert significant influence on each other, thereby impacting the overall economic stability and social well-being of the nation.

Oil prices stand as a pivotal determinant, given India's heavy reliance on imported crude oil to meet its energy demands. Fluctuations in global oil prices have profound ramifications on the Indian economy, affecting inflation, trade balances, and fiscal policies. Moreover, trade openness epitomize by international trade agreement and policies, plays a crucial role in determining the nation's vulnerability to external shocks rise from oil fluctuations.

Understanding the linkage between these multifaceted factors helps to policymakers and stakeholders in formulating effective strategies to mitigate risks. By delving into this nexus, aim is to unravel the intricate relationships between oil prices, trade openness, climate variability and food inflation in India.

Review of Literature

***Ankita Sarmah & Debi Prasad Bal (2016)**

The study shows the impact of crude oil price on the rate of inflation and economic growth in India. The results showed that the crude oil price has a positive impact on the rate of inflation whereas, an inverse relation exists between crude oil price and economic growth.

This study segregates the crude oil into two components, that is positive and negative partial sum of oil price through the nonlinear and asymmetric autoregressive distribution lag framework.

***Lingaraj Mallick & Smruti Ranjan Behera (2020)**

The research confirms that there is evidence of a one connection, between growth and trade openness in India during the period studied and across various sub periods. The model estimating asymmetric error correction shows that trade openness adjusts at rates in response to positive and negative economic growth shocks in the term.

***Pratap Kumar & Mallick (2023)**

The study found that a positive correlation between oil price, food inflation and climate variability. The ARDL model coefficient values show that money supply positively impacts food inflation, whereas lag money supply negatively affects food inflation. Oil price has a positive impact on food inflation and trade openness coefficient is positive but not significant. Temperature change has a negative impact on food inflation. The ARDL-VEC coefficient values indicate that oil price and temperature change have significant causal relationship with food inflation.

***Sachita Yadav (2023)**

The study is to analyses the impact of climate change on the crop yield and crop inflation in India during 2000-2018 with the help of ARDL bounds test. The results showed that there is a significant short run relationship between wheat yield and average annual rain and average maximum temperature.

***Syeda wajiha Kazmi (2011)**

The study covers the period of 1972 to 2011. The data was checked for cross-sectional dependency using CD-test. The empirical results confirmed the long-run relationship between energy consumption and trade openness. This study confirms the influence of trade on energy consumption and that they are positively related. International trade increases the energy demand and economic activities.

Research Methodology

Research Gap:

- There is no study that investigate the impact of oil price, trade openness, climate variability and food inflation in India in a single frame.
- There is no study that shows the relationship between oil price, climate variability and food inflation in India.

Need of the Study:

Oil price, trade openness and climate variability can impact India's economic growth, and studying their effects on food inflation can help policymakers ensure food availability and affordability for India.

Objective of Study:

- To investigate the relationship between oil price, trade openness, climate variability and food inflation in India
- To know the impact of inflation on general public income and savings from past 5 years

Research Design:

Type of study: Descriptive

Elements considered for study: Oil price, Trade openness, Climate variability and food inflation

Data Collection Methods:

Data was collected by using two methods i.e. primary data and secondary data.

- Primary data: This data was collected by conducting a survey
- Secondary data: The was collected through books, articles and from websites.

Sample Size:

The sample size for study, questionnaire distributed to 100 individuals out of which 78 responded.

Questionnaire Design:

The questionnaire consisted of close ended questions, in the form of Multiple-choice question.

Tools and techniques:

The data was collected and analyzed by google forms, Microsoft excel, charts and graphs.

- Independent variable: oil price, trade openness, climate variability and food inflation.
- Dependent variable: Indian economy growth.

Hypothesis:

H0: There is no significant impact of inflation on income level of individuals.

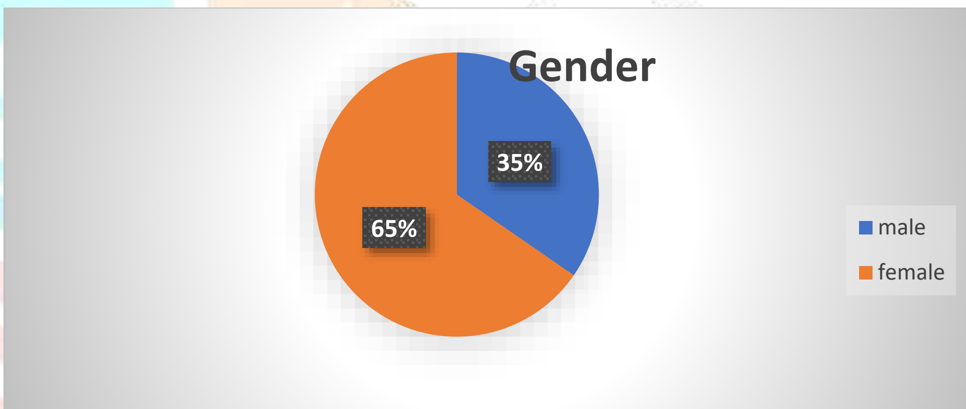
H1: There is a significant impact of inflation on income level of individuals.

Limitations of study:

- The study may limit due to availability and quality of data.
- The lack of knowledge of individuals about factors/elements that affects the growth of Indian economy.
- The information can be biased due to use of questionnaire.

Data Analysis

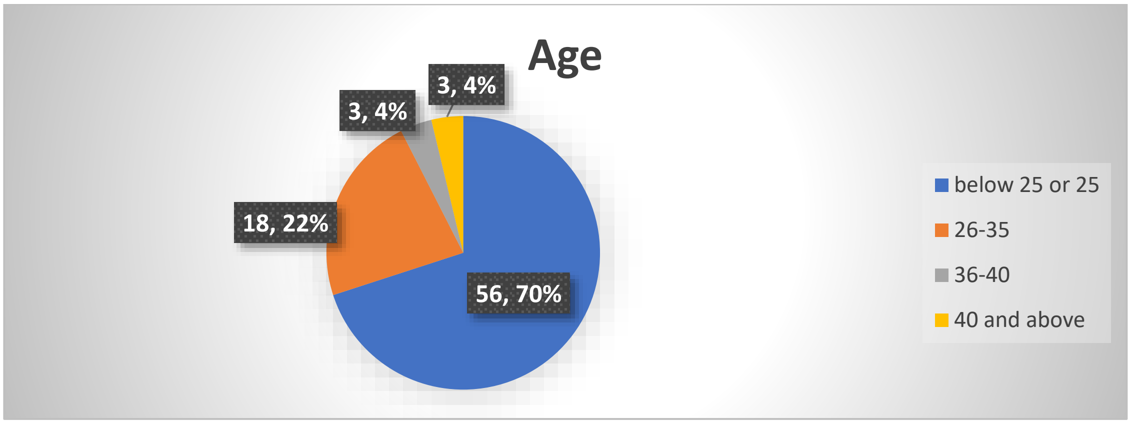
Gender	Male	Female	Total
Responses	27	51	78
Percentage	35	65	100



Interpretation:

Out of 78 individuals 27 were male and 51 are female.

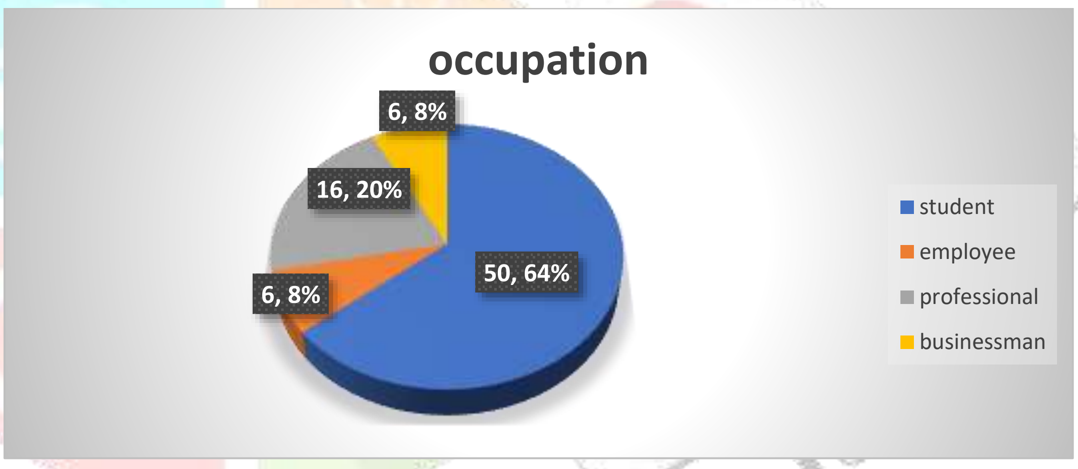
Age	Below 25 or 25	26-35	36-40	40 and above	Total
Responses	56	18	2	2	78
Percentage	70	22	4	4	100



Interpretation:

out of 78 individuals 56 were below 25 or 25 group, 18 people were from 26-35, 2 from 36-40 and 2 from 40 and above age group.

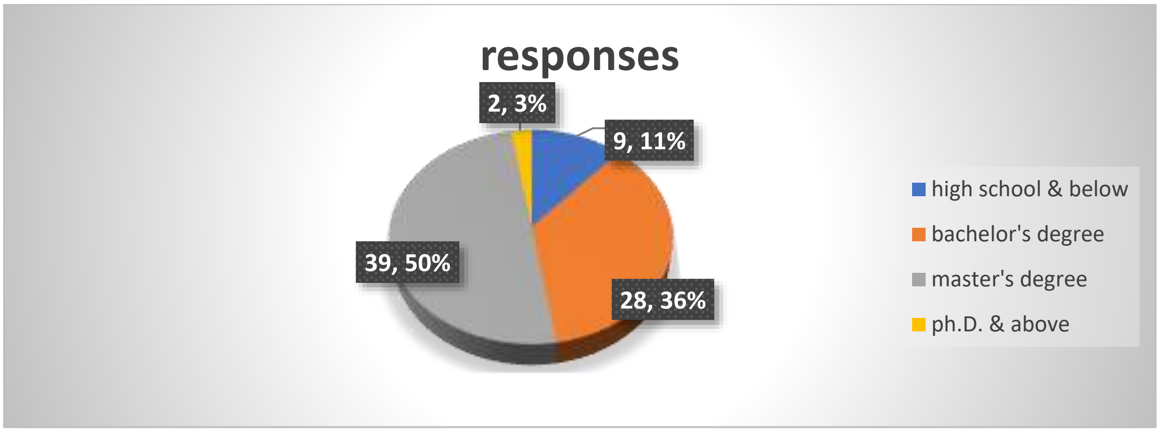
Occupation	Student	Employee	Professional	Businessman	total
Responses	50	6	16	6	78
Percentage	64	8	20	8	100



Interpretation:

Out of 78 individuals 50 people are students, 6 employees, 16 professional and 6 businessmen.

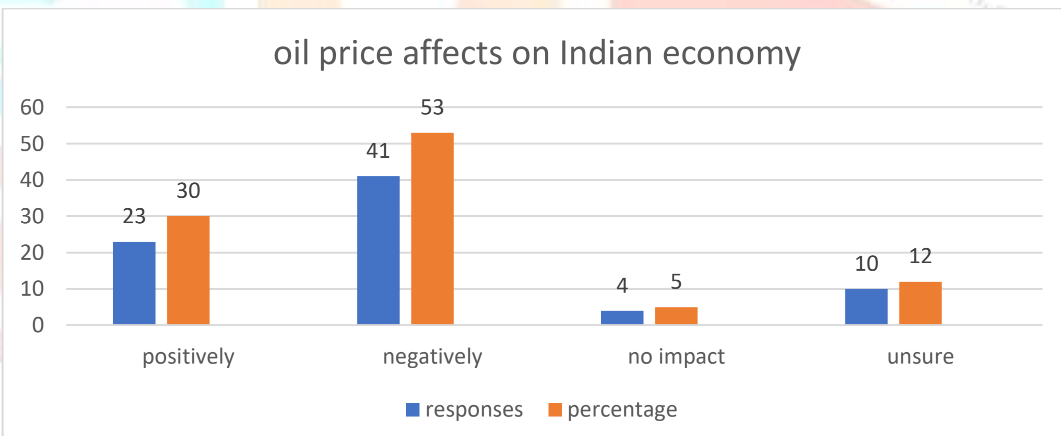
Education	High school or below	Bachelor's degree	Master's degree	Ph.D. or above	Total
Responses	9	28	39	2	78
Percentage	11	36	50	3	100



Interpretation:

Out 78 respondents 50% have master's degree, 36% bachelor's degree, 11% high school and below and 3% have Ph.D.

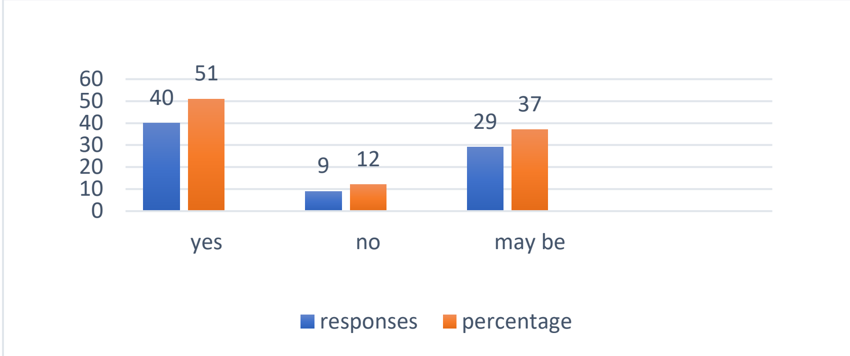
How do you think changes in oil prices affect the Indian economy	Positively	Negatively	No impact	Unsure	Total
Responses	23	41	4	10	78
Percentage	30	53	5	12	100



Interpretation:

Out of 78 individuals 41 said oil prices fluctuation affects the Indian economy negatively, while 23 said positively, 10 said unsure and 4 said no impact.

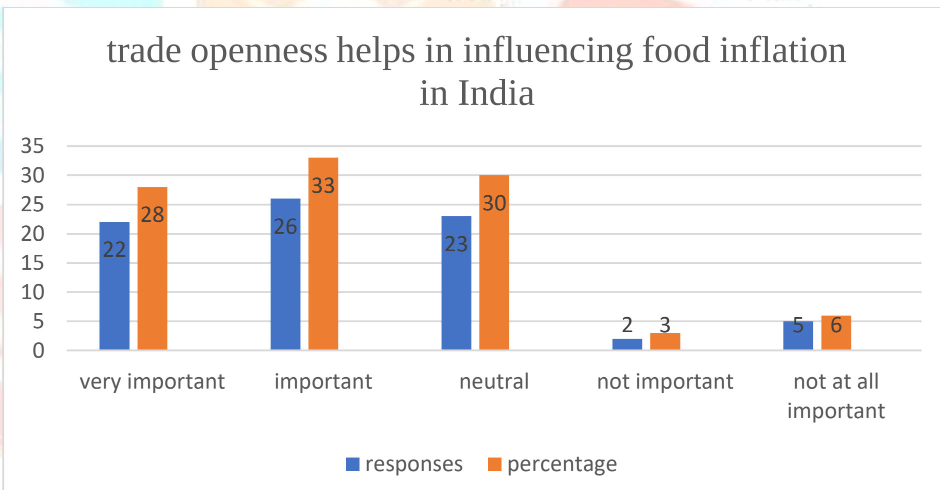
Do you believe increased trade openness can help in reducing the impact of oil prices shocks in India	yes	No	Maybe	Total
Response	40	9	29	78
Percentage	51	12	37	100



Interpretation:

Among 78 individuals 40 consider that trade openness can help in reducing the impact of oil price shocks in India, while 9 said no and remaining 29 are not sure.

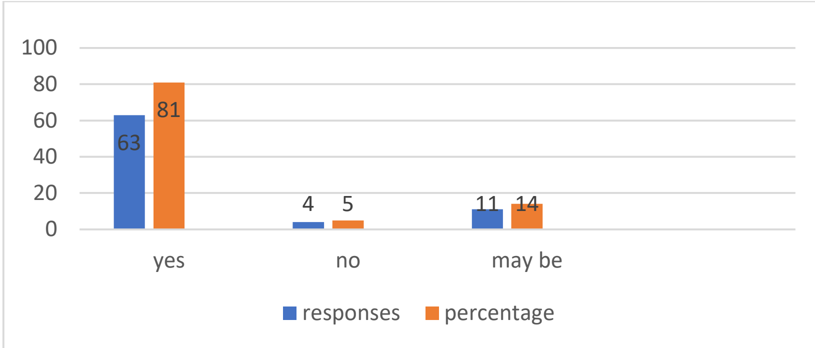
How important is trade openness in influencing food inflation in India	Very important	Important	Neutral	Not important	Not at all important	total
Responses	22	26	23	2	5	78
Percentage	28	33	30	3	6	100



Interpretation:

Out of 78 individuals 25 consider that trade openness is very important in influencing food inflation in India, while 27 said important, 22 said neutral, 2 said not important and 2 said not at all important.

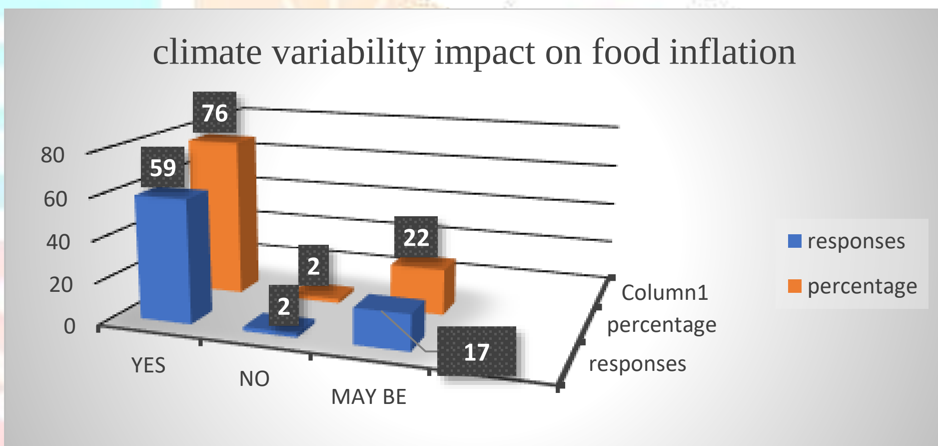
Do you think climate variability affects agricultural productivity in India	yes	No	May be	Total
Responses	63	4	11	78
Percentage	81	5	14	100



Interpretation:

out of 78 individual 63(81%) said that climate variability affects agricultural productivity in India, while 4 said that no and 11 said that may be.

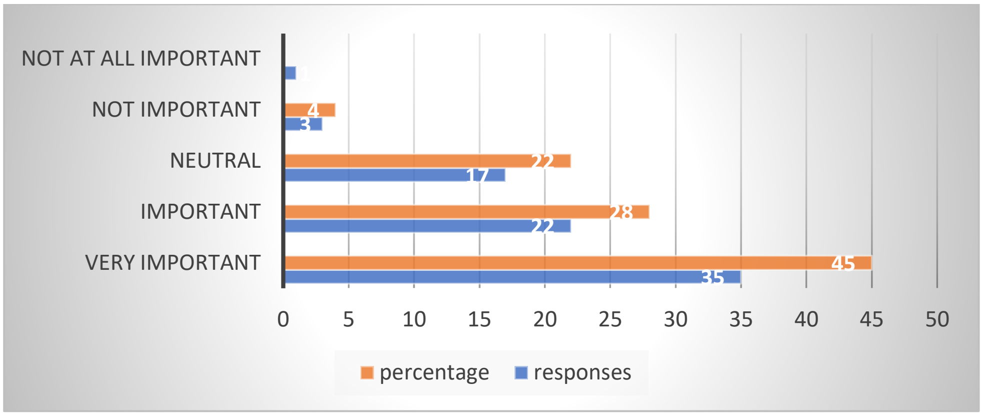
Do you believe climate variability has a significant impact on food inflation	Yes	No	May be	total
Responses	59	2	17	78
Percentage	76	2	22	100



Interpretation:

Among all individuals 59 consider impact of climate variability on food inflation, while 2 said no and 17 said may be;

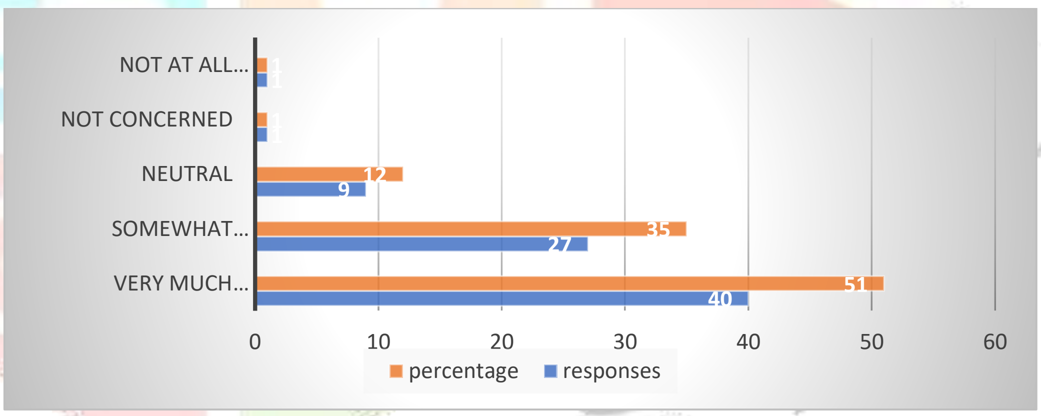
How important is climate variability in influencing food inflation in India	Very important	Important	Neutral	Not important	Not at all important	total
Responses	35	22	17	3	1	78
Percentage	45	28	22	4	1	100



Interpretation:

Among all individuals 35 consider climate variability in very important in influencing food inflation in India, while 22 said important, 17 said neutral, 3 said not important and 1 said not at all.

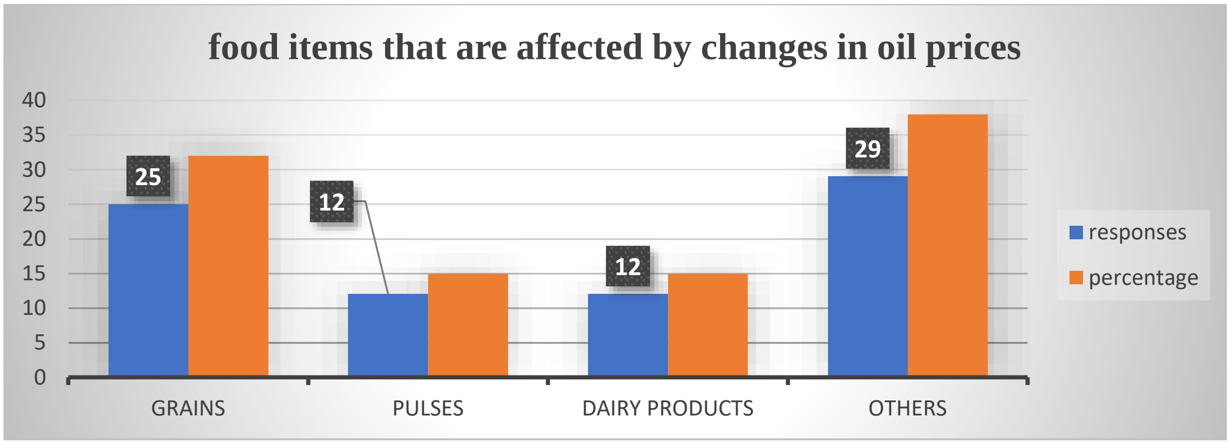
How concerned are you about food inflation in India	Very much concerned	Somewhat concerned	Neutral	Not concerned	Not at all concerned	total
Responses	40	27	9	1	1	78
Percentage	51	35	12	1	1	100



Interpretation:

Out of 78 respondents 40 are very much concerned about food inflation in India, while 27 are somewhat concerned, 9 are neutral, 1 is not concerned and 1 is not at all concerned.

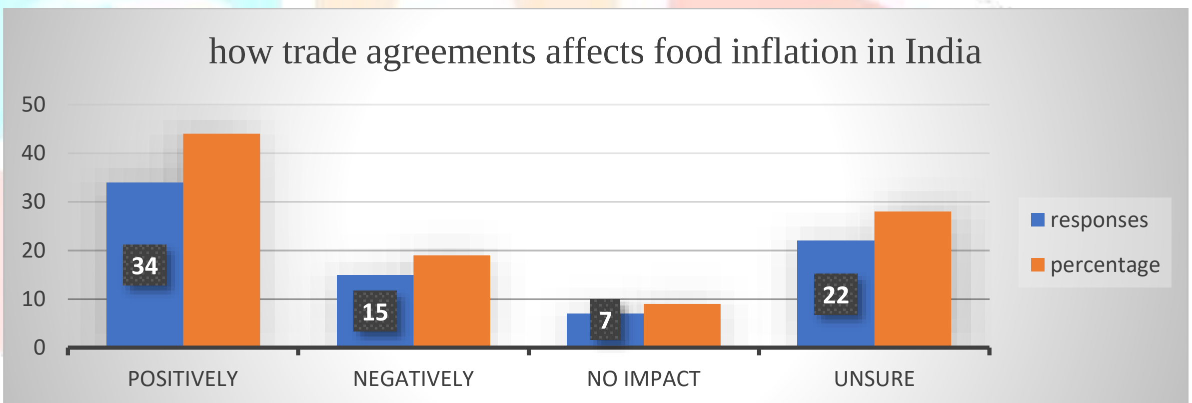
Which food items do you think are most affected by changes in oil prices	Grains	Pulses	Dairy products	Others	Total12
Responses	25	12	12	29	78
Percentage	32	15	15	38	100



Interpretation:

Among all 78 respondents 29 consider other food items that are affected by oil prices, while 25 said grains, 12 said pulses and 12 dairy products.

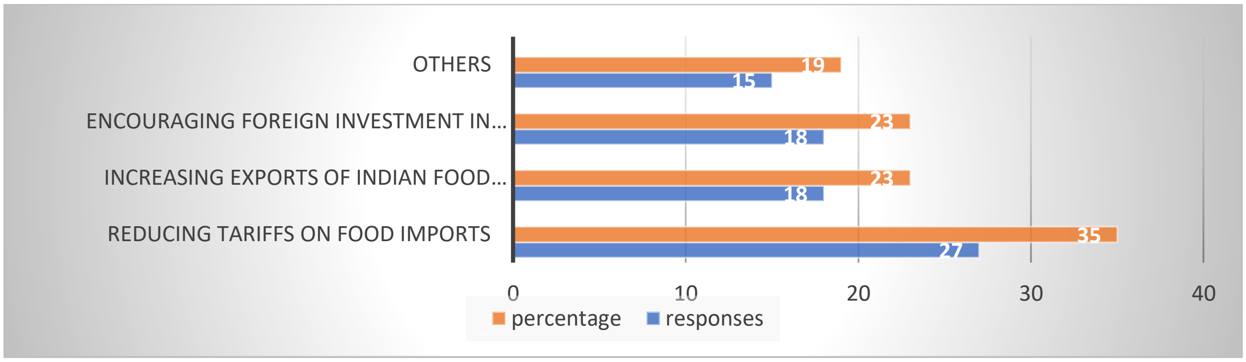
How do you think trade agreements affects food inflation in India	Positively	Negatively	No impact	Unsure	total
Responses	34	15	7	22	78
Percentage	44	19	9	28	100



Interpretation:

Out of 78 individuals 34 people consider positive affect of trade agreements on food inflation in India, while 15 consider negative, 7 no impact and 22 said unsure.

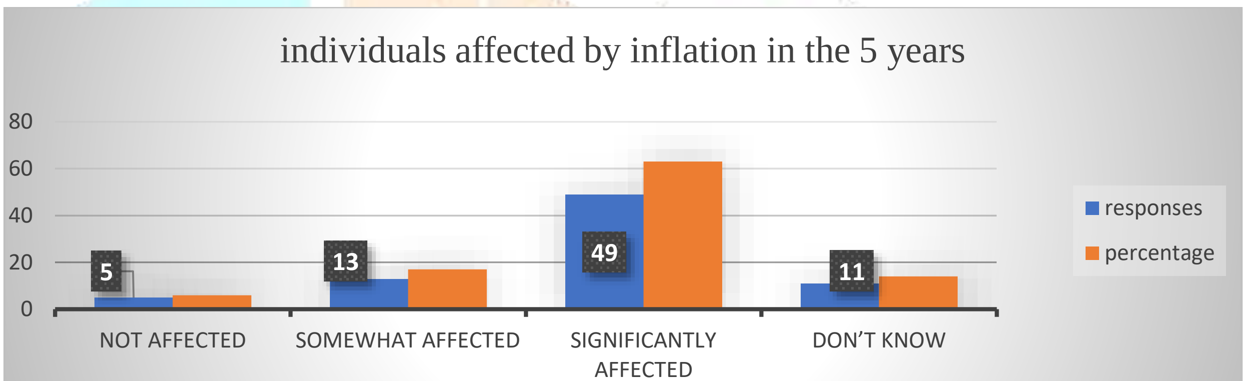
What trade policies do you think are most effective in reducing food inflation	Reducing tariffs on food imports	Increasing exports of Indian food products	Encouraging foreign investment in Indian agriculture	Others	total
Responses	27	18	18	15	78
Percentage	35	23	23	19	100



Interpretation:

Among all 78 individuals most of people consider reducing tariffs on food imports, while 23% people said increasing exports of Indian food products, 23% encouraging foreign investment in Indian agriculture.

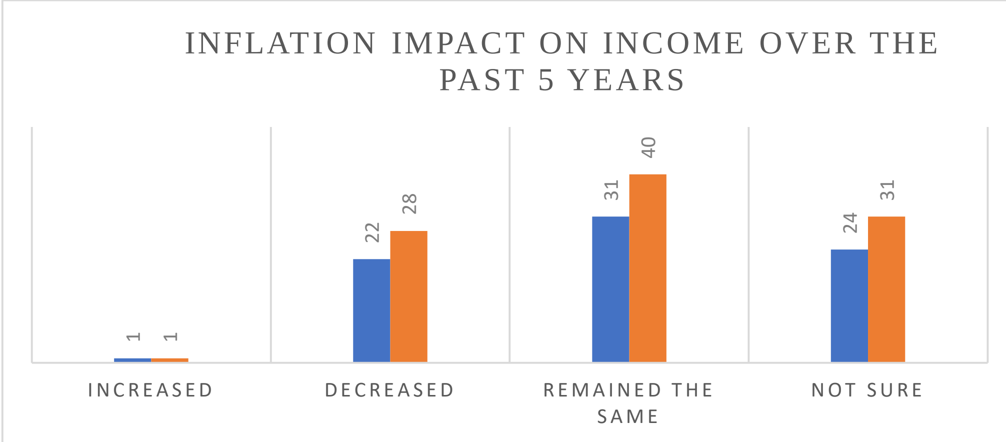
How have you been affected by inflation in the past 5 years	Not affected	Somewhat affected	Significantly affected	Don't know	total
Responses	5	13	49	11	78
Percentage	6	17	63	14	100



Interpretation:

From 78 individual's majority of individuals with 63% said that they were significantly affected by inflation in past 5 years, while 17% said somewhat affected, 14% said don't know and 6% said not affected.

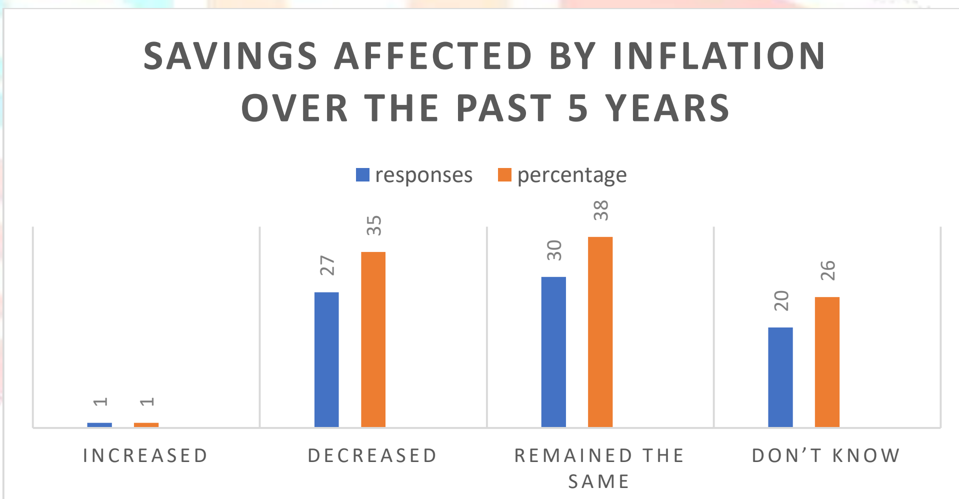
How has inflation impacted your income over the past 5 years	Increased	Decreased	Remained the same	Not sure	Total
Responses	1	22	31	24	78
Percentage	1	28	40	31	100



Interpretation:

Among all 78 individuals 31 people said that their income remained same after increase in inflation over the past 5 years, while 22 said decreased, 24 said not sure and 1 said increased.

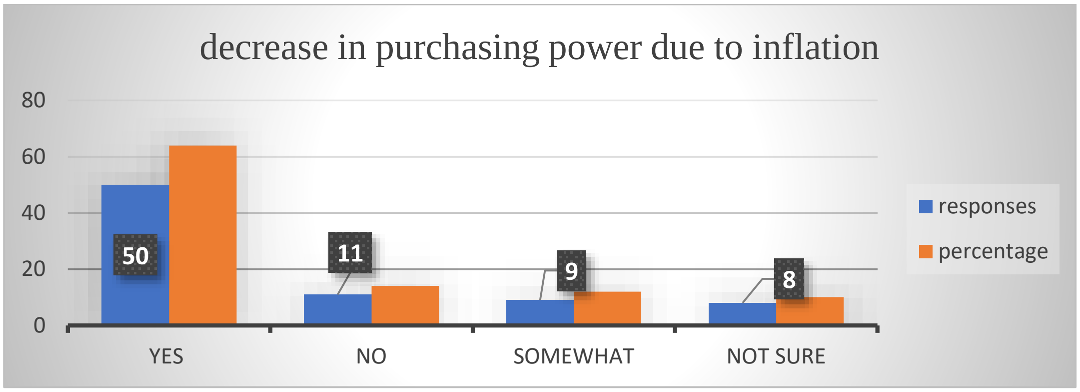
How has inflation affected your savings over the past 5 years?	Increased	Decreased	Remained the same	Don't know	total
Responses	1	27	30	20	78
Percentage	1	35	38	26	100



Interpretation:

Out of 78 respondent's majority with 30 individuals said savings are remained same during inflation, while 27 said decreased, 20 said not sure and 1 said increased.

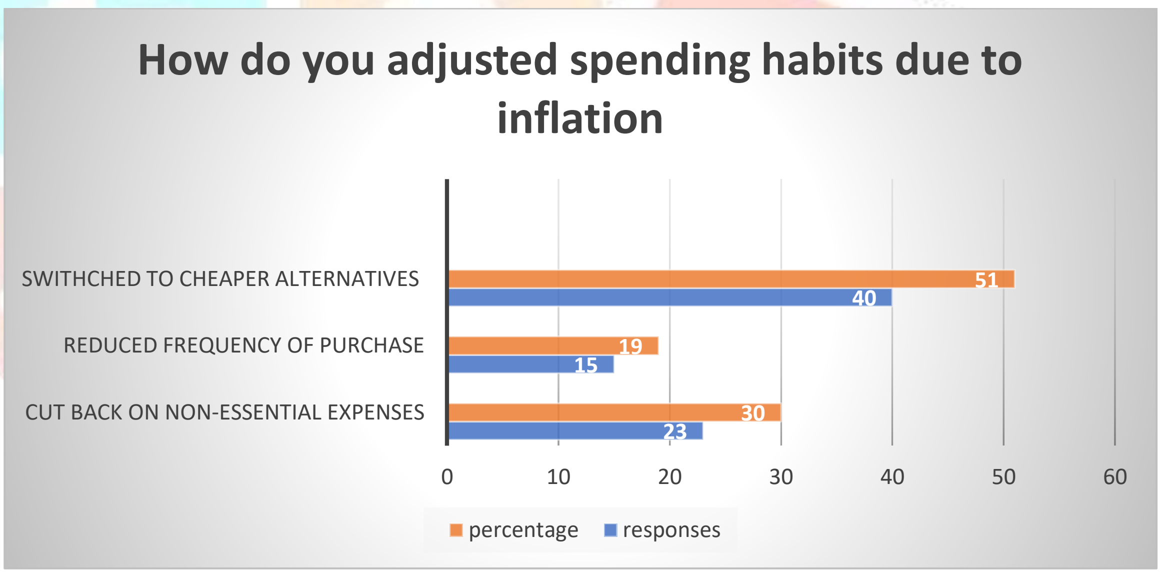
Have you noticed a decreased in purchasing power due to inflation?	Yes	No	Somewhat	Not sure	Total
Responses	50	11	9	8	78
Percentage	64	14	12	10	100



Interpretation:

Out of 78 individuals 50 noticed that decreased in purchasing power due to inflation, while 11 said no, 9 said somewhat and remaining 8 said not sure.

How have you adjusted your spending habits due to inflation?	Cut back on non-essential expenses	Reduced frequency of purchase	Switched to cheaper alternative	total
Responses	23	15	40	78
percentage	30	19	51	100



Interpretation:

Among all 78 respondent's majority with 51% said they adjusted their spending habits by switching to cheaper alternatives, while 30% said by cut back on non-essential expenses and 19% said by reducing frequency of purchase.

Statistical Tools for Analysis

Statistical tool: Chi-square statistic

H0: There is no significant impact of inflation on income level of individuals.

H1: There is a significant impact of inflation on income level of individuals.

	Yes	**No**	**Row Total**
Male	20(15.92) [1.04]	7(11.08) [1.50]	27
Female	26(30.08) [0.55]	25(20.92) [0.79]	51
Column Total	46	32	78 (Grand Total)

The chi-square statistic is 3.8914. The *p-value* is 0.048534. The result is not significant at $p < 0.05$.

Since the p value is less than 0.05, we reject H0 and accept H1. Therefore, there is a significant impact of inflation on income level of individuals.

Results			
	yes	no	***Row Totals***
>25 or 25	11 (11.21) [0.00]	8 (7.79) [0.01]	19
26-35	9 (11.79) [0.66]	11 (8.21) [0.95]	20
36-40	20 (17.69) [0.30]	10 (12.31) [0.43]	30
40<	6 (5.31) [0.09]	3 (3.69) [0.13]	9
Column Totals	46	32	**78(Grand Total)**

The chi-square statistic is 2.5772. The *p-value* is 0.461496. The result is not significant at $p < 0.05$.

Findings of the Study

- Study reveals that Among all 78 individuals most of the individuals consider that the oil prices influence the inflation rate, that may impact the growth of Indian economy.
- Out of 78 individuals 41 said oil prices fluctuation affects the Indian economy negatively, while 23 said positively, 10 said unsure and 4 said no impact.
- Most of individuals consider trade openness influence the inflation rate, that may impact the growth of Indian economy.

- Among all individual most of them consider climate variability influence the inflation rate, that may impact the growth of Indian economy.
- Out of 78 individuals 35 consider climate variability in very important in influencing food inflation in India, while 22 said important, 17 said neutral, 3 said not important and 1 said not at all.
- Study reveals that Most of the individuals shows positive concern towards increasing food inflation in India.

Suggestions

- Reduce dependence on crude oil imports by investing in renewable energy sources and promoting energy efficiency.
- Continue trade liberalization policies to increase trade openness and promote economic growth.
- Set inflation targets and implement monetary policies to achieve them, ensuring price stability.
- Implement policies to improve agricultural productivity and food distribution, reducing the impact of global food price shocks.
- Determine climate infrastructure and implement policies to reduce greenhouse gas emissions.
- Encourage economic diversification to reduce dependence on few industries and promote sustainable growth.

Conclusion

This study examined the interplay between oil price, trade openness, climate variability and food inflation in India. The study finds that:

- Oil price and trade openness have significant impacts on food inflation in India.

- Climate variability negatively affects food inflation, particularly in India.

- Trade liberalization and diversification can help mitigate the effects of oil price shocks and climate variability on food inflation.

- Investing in agricultural research, and sustainable trade practices can promote long-term economic growth and food security.

This study's findings offer valuable insights for seeking address to the complex challenges of food inflation, climate change, and economic development in India. By implementing policies that promote sustainable trade, energy diversification, and climate resilience, India can build a more food-secure and economically sound in future.

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