An Ordinal Logistic Regression Model to assess the impact of inflation on households' ability to afford basic necessities in the Chittagong Hill Tracts

Abstract:

This study examines how inflation affects households' ability to afford basic necessities in the Chittagong Hill Tracts (CHT) of Bangladesh using survey data from 420 households and an ordinal logistic regression model. Affordability difficulty is treated as an ordered welfare outcome, allowing identification of varying levels of economic stress. Results show a strong nonlinear effect of inflation: households perceiving moderate and high price increases are about 37 and 70 percentage points more likely, respectively, to face extreme affordability difficulty. Higher income significantly reduces vulnerability, while worsening employment conditions sharply increase hardship. In contrast, education, occupation, and number of earners have limited influence once economic shocks are considered. The findings highlight inflation severity, income constraints, and labor market instability as the primary drivers of welfare loss, emphasizing the need for targeted income and employment protection alongside price stabilization policies in marginalized regions.

1. Introduction

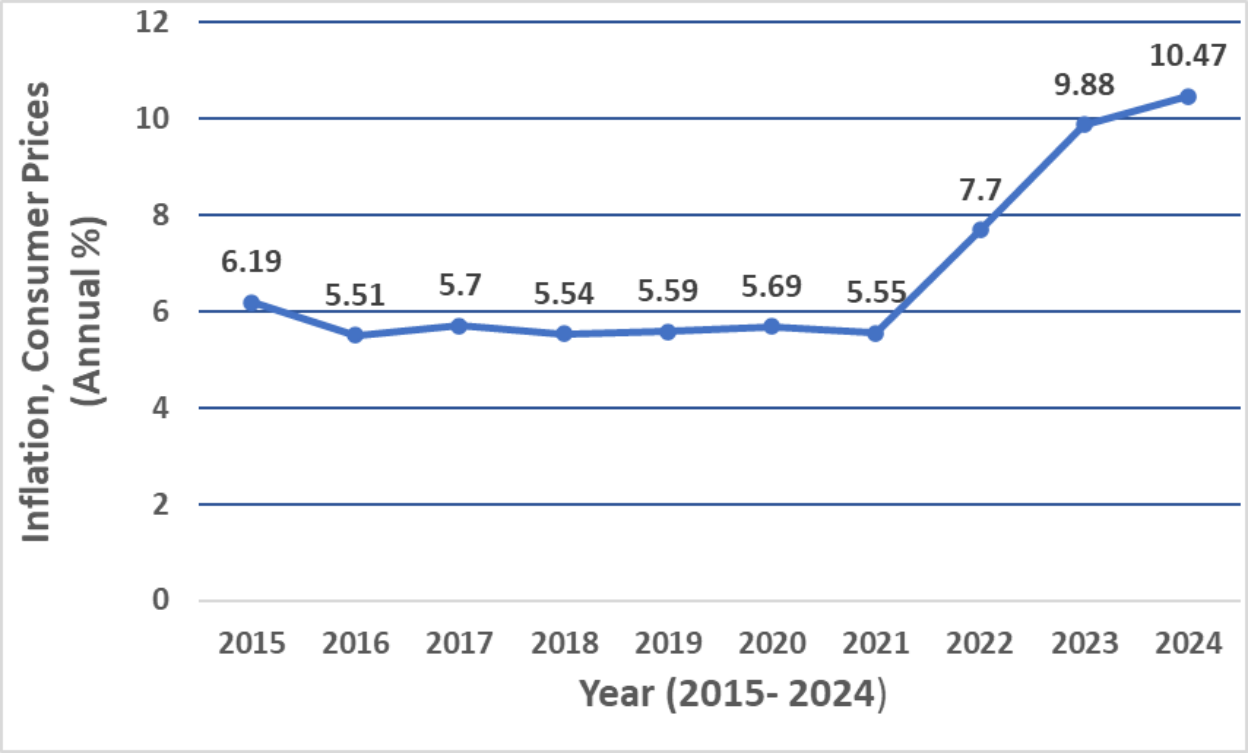
Inflation, defined as a sustained, ongoing increase in the general price level of goods and services in an economy over a period of time, represents a persistent macroeconomic challenge with far-reaching implications for household welfare, particularly in developing economies where income growth often fails to keep pace with rising prices (Easterly & Fischer, 2001). Beyond its impact on aggregate macroeconomic indicators, inflation directly erodes purchasing power, constraining households' ability to afford essential goods and services such as food, healthcare, and transportation. These effects are not experienced uniformly across regions or socioeconomic groups; rather, they tend to be more severe in geographically isolated and economically vulnerable areas where market access is limited and coping mechanisms are weak (Deaton, 2016). Understanding how inflation translates into household-level affordability stress is therefore essential for evaluating its welfare consequences.

Inflation is an issue that countries all over the world face, but for areas that are already economically vulnerable, it can have even more severe consequences. In Bangladesh, inflation has emerged as an increasing concern for household economic security, particularly in the context of post-pandemic recovery and global supply-side disruptions. Although the country has made notable progress in

economic growth and is transitioning out of Least Developed Country (LDC) status, rising inflation has threatened to undermine recent poverty-reduction gains, and inflation still remains a tough challenge; especially in the more remote regions like the CHT (UNCTAD, 2021). Events like the COVID-19 pandemic and the Russia-Ukraine conflicts have caused oil and food prices to rise, making inflation worse and putting Bangladesh's economy under strain. As a result, food insecurity has worsened, particularly among low-income and nutritionally vulnerable groups.

Between 2015 and 2021, as shown in the figure 1, Bangladesh experienced an extended phase of moderate and stable inflation, signifying relative macroeconomic stability. However, after COVID-19 invasion, from 2022 onward, inflation surged markedly, attaining double-digit rates by 2023–2024.This transition signifies a confluence of global supply disruptions, currency devaluation, and internal structural limitations. The persistent increase in inflation has substantial welfare consequences, disproportionately impacting low-income households, diminishing real earnings, and presenting challenges for the efficacy of monetary policy.

Figure 1: National Level Inflation Rate of Bangladesh (2015- 2024)



Data source: World Bank.

National-level analyses indicate that food and non-food inflation have significantly reduced real incomes, disproportionately affecting low-income households whose expenditures are concentrated on basic necessities. However, such aggregate assessments often obscure localized experiences of

affordability, especially in regions with distinct socio-economic and geographical constraints. The Chittagong Hill Tracts (CHT) represent one such region. Characterized by rugged hilly terrain, underdeveloped infrastructure, and relatively weak integration with national markets, the CHT faces structural challenges that can amplify the welfare effects of inflation. In this area, where most people depend on farming and small businesses, the increasing cost of food, transportation, and daily necessities is making life more difficult. Since the region is already somewhat cut off from the major economic hubs, inflation adds an extra layer of hardship. Households in this region incur higher transportation and transaction costs, face limited livelihood diversification, and have restricted access to public services and formal employment opportunities (Rahman & Ali, 2019). These constraints make the CHT particularly sensitive to price shocks, as even modest increases in the cost of food and daily necessities can generate substantial affordability stress. Development studies further suggest that indigenous and rural communities in the CHT experience higher vulnerability to economic shocks due to limited institutional support and market isolation (Sen, 2014).

Despite the relevance of these concerns, empirical evidence on the impact of inflation on household affordability in the Chittagong Hill Tracts remains limited. Existing studies on inflation and welfare in Bangladesh predominantly focus on urban areas or rely on aggregate consumption and poverty indicators, which may fail to capture the nuanced ways households perceive and experience affordability constraints (Ravallion & Ravallion, 2016). In practice, households often report affordability difficulties in order terms, ranging from no difficulty to severe difficulty in meeting basic needs. Treating such outcomes as continuous or binary risks obscuring important differences in vulnerability, adjustment capacity, and coping behavior across households.

To address this gap, the present study examines the impact of inflation on households' ability to afford basic necessities in the Chittagong Hill Tracts using an ordinal analytical framework. Household affordability is conceptualized as an ordered outcome reflecting increasing levels of difficulty in meeting essential needs. This approach recognizes that affordability stress is inherently hierarchical and allows for a more precise assessment of how inflation influences the probability of households transitioning between different levels of economic strain. By employing an ordinal logistic regression model, the econometric specification is aligned with the structure of the dependent variable, thereby improving both statistical validity and interpretability.

This study contributes to the literature in three important ways. First, it provides micro-level evidence on inflation-induced affordability challenges in an under-researched and economically marginalized region of Bangladesh. Second, it advances methodological practice by applying an ordinal modeling approach that captures the graded nature of household affordability outcomes. Third, the findings offer policy-relevant insights for designing targeted, region-specific interventions aimed at mitigating the welfare impacts of inflation among vulnerable populations. In doing so, the study aligns with broader

development objectives related to poverty reduction and inclusive economic growth under the Sustainable Development Goals (SDG 1, SDG 2, SDG 8, SDG 10, SDG 11, SDG 12, SDG 17)

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 outlines the methodology and analytical framework. Section 4 presents the empirical results. Section 5 discusses the key challenges facing households in the Chittagong Hill Tracts. Section 6 concludes with policy implications and recommendations.

2. Literature Review

The Chittagong Hill Tracts (CHT) sits in Bangladesh's far southeast, a place shaped by steep hills, remote valleys, and a mix of ethnic communities, and it has long drawn scholarly interest because of its entrenched socioeconomic inequalities and development challenges. Researchers have long been drawn to this area, not only for its cultural richness but also because deep inequalities and slow progress in development remain stubbornly in place. With Bangladesh set to leave the list of Least Developed Countries in 2026 — a move first recommended by the United Nations in 2021 — the challenges facing the CHT deserve fresh attention. Inflation, now hitting households across the region, makes this even more urgent, as it risks pushing back the hard-won steps toward sustainable development in one of the country's most disadvantaged areas.

Early work by (Islam et al., 2025; Ragab Mahmoud, 2025; Saha & Kar, n.d; Hossain & Mujeri, 2020; Abada et al., 2021; Ziegelhofer, n.d.) demonstrates that inflation diminishes households' real purchasing power by elevating the cost of basic items in relation to nominal income growth, thereby constraining their ability to meet basic needs. Low- and middle-class households are disproportionately affected by persistent price rises, which force them to cut back on the consumption of necessities like food, energy, and medical care. These empirical studies emphasize that the ability of households to maintain minimum living standards is weakened by inflation, especially when salary adjustments lag behind price rises. Recent study by (Eşer Durmaz et al., 2025) shows that food inflation is particularly harmful since, as food and other necessities account for a larger share of their total expenditure, leaving little opportunity for savings or substitution in developing economies. These findings offer a solid theoretical foundation for analyzing household affordability difficulties of basic needs under inflationary pressure.

Empirical research by (Headey & Martin, 2016; Alam et al., 2024) from developing nations indicates that increases in food prices substantially impact poverty and food security by diminishing real purchasing power, particularly among net consumers and low-income households, demonstrating a negative relationship between inflation and household welfare outcomes, particularly food security and consumption adequacy. A study by (Islam et al., 2025) and national survey evidence from Bangladesh

(Islam et al., 2025)‘Summary | Effects of Inflation on the Livelihoods of Poor Households in Bangladesh’, n.d.) indicate that escalating food costs markedly exacerbate household vulnerability, resulting in diminished dietary diversity, heightened food insecurity, and dependence on detrimental coping mechanisms(e.g., reduced consumption, borrowing, schooling changes, switching to lower-quality foods, and cutting non-food expenditures) to cope with deteriorating affordability, particularly among economically disadvantaged groups. Furthermore, studies by (Ziegelhofer, n.d.) shows that households experiencing food price shocks frequently resort to detrimental coping mechanisms, such decreasing calorie consumption, opting for less expensive food options, or diverting funds from health and education, which can have adverse long-term welfare effects. Evidence from rural Bangladesh (Akter & Basher, 2014) shows that food price and income shocks disproportionately aggravated food insecurity among poorer households, forcing adjustments in consumption patterns, and thereby worsening overall welfare outcomes. The study on household food security and psychological well-being among adults in Bangladeshi slums (Hasan et al., 2025) illustrates how economic instability, intensified by inflation, results in diminished consumption of healthy food, hence connecting affordability to physical and mental health consequences. These results support the inclusion of inflation as a crucial explanatory variable in welfare assessments by highlighting it as a significant macroeconomic shock that directly impedes households' ability to afford basic necessities.

The study by (Akter & Basher, 2014) uses logistic-based models with ordered outcomes (food security levels) to examine how food price and income shocks affect food security and wellbeing among rural households in Bangladesh. Dibaba B. Gemechu and Leonard O. M. Elifas (Gemechu & Elifas, 2025) employ ordinal logistic regression to ascertain socioeconomic factors linked to varying severity levels of family food insecurity, therefore successfully capturing gradations in deprivation. Furthermore, the study by (Rahman et al., 2024) uses binary logistic and multinomial logistic regression models to determine food security conditions and factors affecting food security of the Chittagong Hill Tracts (CHT) population. (Majumder et al., n.d.) apply multiple logit regression models to identify the factors affecting food security at household level at upazila (sub-district) level. Research from Ethiopia and Afghanistan (AMINU, 2023; Delbiso et al., 2024) uses ordinal or ordered logit models to examine outcomes such as socioeconomic position, multidimensional poverty, and vulnerability to food insecurity.

Important theoretical frameworks such as Engel's Law and the cost-of-living approach provide crucial foundations for understanding how inflation affects household consumption behavior. According to Engel's Law (Ernst Engel, 1857), as real income declines due to rising prices, households devote a larger share of their limited income to food and other necessities, reducing spending on other goods and services. The cost-of-living framework (Cost-of-Living Crisis) explains how inflation raises the minimum income required to maintain basic standards of living, disproportionately affecting low-income households and eroding real purchasing power. Because poorer households experience higher

effective inflation and decreased affordability, policy literature by (Nasir, Muhammad et al., 2025) highlights how inflation threatens social welfare, especially in areas with insufficient safety nets. This emphasizes the necessity for focused actions to safeguard household welfare during inflationary periods. These arguments lend credence to the claim that inflation not only drives up prices but also structurally limits households' capacity to meet their basic needs.

Despite an extensive amount of study on inflation and household welfare, there is no empirical data on geographically marginalized areas like the Chittagong Hill Tracts, where livelihood structures and market access differ greatly from the national average. While the ordinal logistic regression model is used in food insecurity studies, it hasn't been widely applied to inflation and affordability of basic necessities. Furthermore, existing studies often rely on binary indicators of welfare outcomes, which fail to capture varying degrees of affordability stress. This study fills in these gaps and offers region-specific, policy-relevant data on the welfare effects of inflation by using an ordinal logistic regression model to ordered categories of households' capacity to afford basic necessities.

3. Methodology

3.1 Study Area

This study was conducted in three districts in the CHT region, namely Rangamati, Bandarban, and Khagrachari, and covering three and four upazilas. Every upazila covers at least 6 to 7 wards of different unions Moreover we have ensured the validation of data in every local area. The target population comprises general households impacted by inflation-induced economic challenges.

1*) Population and Sample:* This cross-sectional study was based on primary data collected through in-person interviews with different households, income earners, and employees living in the low-income settings in CHT. Data collection was done using a printed questionnaire, which was designed in such a way that it could reflect a household's economic situation, difficulty in affording basic necessities due to inflation. A total of 420 households were selected using a stratified random sampling technique. Stratification was based on ethnicity, income levels, and geographic distribution (urban, semi-urban, rural) to ensure a representative sample. A structured questionnaire was administered to collect data. The data collection was done in late 2025. The questionnaire was pre-tested to ensure it was comprehensible and included suggested modifications based on the needs of the study.

2) Dependent Variable: The regressand of this study is affordability difficulty among households in the Chittagong Hill Tracts (CHT). Affordability difficulty represents the extent to which households face challenges in meeting basic living expenses due to rising prices and reduced purchasing power. It is a key outcome of inflation as it directly reflects households' financial strain. In this study, affordability difficulty is measured on an ordinal scale based on respondents'perceived level of

difficulty, ranging from low to high. This measure appropriately captures differences in the severity of affordability challenges and serves as the dependent variable for the econometric analysis.

3. Description of Regressand*:*

In this study, affordability difficulty is treated as an ordinal response variable, reflecting ordered categories from low to high difficulty (1 to 4 scale). This categorization allows for meaningful comparison of households facing different levels of financial stress while preserving the ordinal nature of the response.

In short, let affordability difficulty be denoted by Y. Let Y be a categorical response variable with k+1 (k = 3) ordered categories, coded as 1, 2, 3, and 4.

This ordered classification justifies the use of ordinal econometric models to examine the socioeconomic determinants of affordability difficulty in the CHT.

$$Y = Afford\ difficulty \begin{cases} 1 = No\ difficulty \rightarrow no\ problem \\ 2 = \text{Slightly difficult} \rightarrow \text{minor problems} \\ 3 = \text{Moderately difficult} \rightarrow \text{noticeable problems} \\ 4 = \text{Extremely difficult} \rightarrow \text{severe problems} \end{cases}$$

4) Independent Variable: Perceived Price Increase (ppi), which is measured using a categorical (ordinal) response range from no discernible price increase to a significant increase, is one of the study's primary explanatory variables. Household Income and Employment Instability are also two significant predictors of this study. The regressors together with their descriptions are presented in Table I.

Table I: Dependent (DV) and Independent (IV) Variables to Be Modeled

Variable	**IV/DV**	**Valid Range**	**Variable Type**
Afford difficulty	DV	(1-4): 1 = No difficulty, 2 = Slightly difficult, 3 = Moderately difficult, 4 = Extremely difficult	Categorical (Ordinal)

Perceived price increase	IV	(1-4): 1 = No noticeable increase, 2 = Slight increase,3 = Moderate increase, 4 = High increase	Categorical (Ordinal)
Household income	IV	(1-4): 1 = Less than BDT 10,000, 2 = BDT 10,000 – 20,000, 3 = BDT 20,000 – 30,000, 4 = Above BDT 30,000	Categorical (Ordinal)
Earning members	IV	Count	Continuous
Employment instability	IV	(1-3): 1 = Improved, 2 = No change, 3 = Worsened	Categorical (Ordinal)
Education level	IV	(1-5): 1 = No formal education, 2 = Primary education, 3 = Secondary education, 4 = Higher secondary, 5 = Higher education	Categorical (Ordinal)
Occupation types	IV	(1-5): 1 = Agriculture, 2 = Daily labor, 3 = Business, 4 = Service, 5 = Other	Categorical

Source: Author's computation using survey data using STATA

3.2 Statistical Model

3.2.1 Descriptive Statistics

Statistical analysis that would be used in this study was descriptive statistics such as a table, bar-charts to describe the frequency distribution and percentage.

3.2.2 Chi-square Test Statistics

It was used to analyze the association between dependent and independent variables. Hypothesis testing: Ho: There was significant association between dependent variable and independent variables Vs H1: There was no significant association

3.2.3 Ordinal Logistic Regression

Logistic regression is applicable for modeling a categorical dependent variable based on one or more independent factors when the dependent variable has two possible outcomes. Ordinal logistic regression (OLR) is a form of logistic regression analysis utilized when the response variable possesses more than two categories that exhibit a natural order or ranking. Considering that households face differing levels of difficulty in affording basic necessities, ordinal logistic regression is especially

appropriate for modeling affordability outcomes influenced by inflation, which are assessed on an ordered scale, as elaborated in advanced econometric treatments of limited dependent variable models (Greene, 2003). Ordinal logistic regression is extensively utilized in research investigating ordered welfare outcomes, including food insecurity levels, poverty severity, and affordability constraints, as it accurately models ordered categories without presuming equal intervals between them (J. Scott Long & Jeremy Freese, 2014). Since, the dependent variable in this study (afford difficulty) is polychotomous and ordinal in nature, the best choice model often used to preserve information about the ordering of the categories of the dependent variable is the ordinal logistic regression model. In ordinal logistic regression, rather than modeling the likelihood of a singular event, as is done in logistic regression, we assess the probability of that event and all subsequent events in the ordinal hierarchy.

Hence the model;

$$logitP\ (Y \leq j) = \beta_{j=0} - \beta_{j=1}X_1 + + \cdots + \beta_{j=p}X_p\ f\ or\ j = 1, \ldots, j-1$$

With P predictors is called the ordinal logistic regression Model.

Also, let $\{P_0, P_1 \ldots P_{j-1}\}$ be the associated probabilities. The cumulative probability of a response less than and equal to j is given as:

$$P(Y \leq j) = \frac{\exp\ (\alpha_j + \beta_x)}{(1 + \exp(\alpha_j + \beta_x))}$$

Where $\boldsymbol{log}\ \left[\frac{P(Y \leq j)}{P(Y > j)}\right] = \boldsymbol{\alpha_j - \beta_x, j} \in [\mathbf{1}, \boldsymbol{j} - \mathbf{1}]$

a_j is the intercept and is the log-odds of falling into category j or below.

The cumulative logit is given as:

$$\boldsymbol{log}\ \left[\frac{\boldsymbol{P(Y \leq j)}}{\boldsymbol{P(Y > j)}}\right] = \boldsymbol{log}\ \left\{\frac{\boldsymbol{P(Y \leq j)}}{\mathbf{1} - \boldsymbol{P(Y \leq j)}}\right\}$$

$$= \boldsymbol{log}\left(\frac{\boldsymbol{P_1 + \cdots + P_j}}{\boldsymbol{P_j + 1 + \cdots + P_j}}\right)$$

3.3 Link Function

Link functions are transformations of cumulative probabilities that facilitate the estimation of the model. The (cumulative) response is linked to the set of predictor variables using link functions. The logit link function is the most widely used and standard default link function when building an ordinal regression model, which allows the effects associated with specific predictor variables to be expressed as odds-ratios. Other link functions can be used to construct ordinal regression, depending on how the ordinal results are distributed. Table II lists a few of these link functions.

Table II: Link Functions and Their Forms in Ordinal Regression

Link Function	Formula	Typical Implementation
Logit	$f(x) = log\left(\frac{x}{1-x}\right)$	Evenly distributed categories
Probit	$F^{-1}x$	Normally distributed variable
Negative log-log	$-\log(-\log(x))$	Higher probability of low categories
Complementary log-log	$\log(-\log(1-x))$	Higher probability of high categories
Cauchit (inverse Cauchy)	$\tan(\pi(x-0.5))$	Outcome with many extreme values

Source: Author's computation using survey data using STATA

4. Empirical Analysis

The primary objective of this analysis was to determine whether variable(s) significantly influence household affordability difficulties in the Chittagong Hill Tracts. The descriptive and exploratory analysis is shown below.

A. Descriptive and Exploratory Data Analysis

The degree of household affordability problem for each ordered category of the dependent variable is shown in the bar plot in Figure 2. The category of extremely affordability difficulty (58.37%) is clearly higher than all the other categories. Nonetheless, the category of somewhat difficult and no affordability problem is lower than that of moderately difficult affordability trouble. With more than 83% of respondents rating moderate to extreme difficulty, the bar plot as a whole shows a significantly skewed distribution toward severe difficulty. This pattern highlights how pervasive and serious the

problem is, offering compelling support for additional econometric research and policy-focused discussion in the subsequent sections of the study.

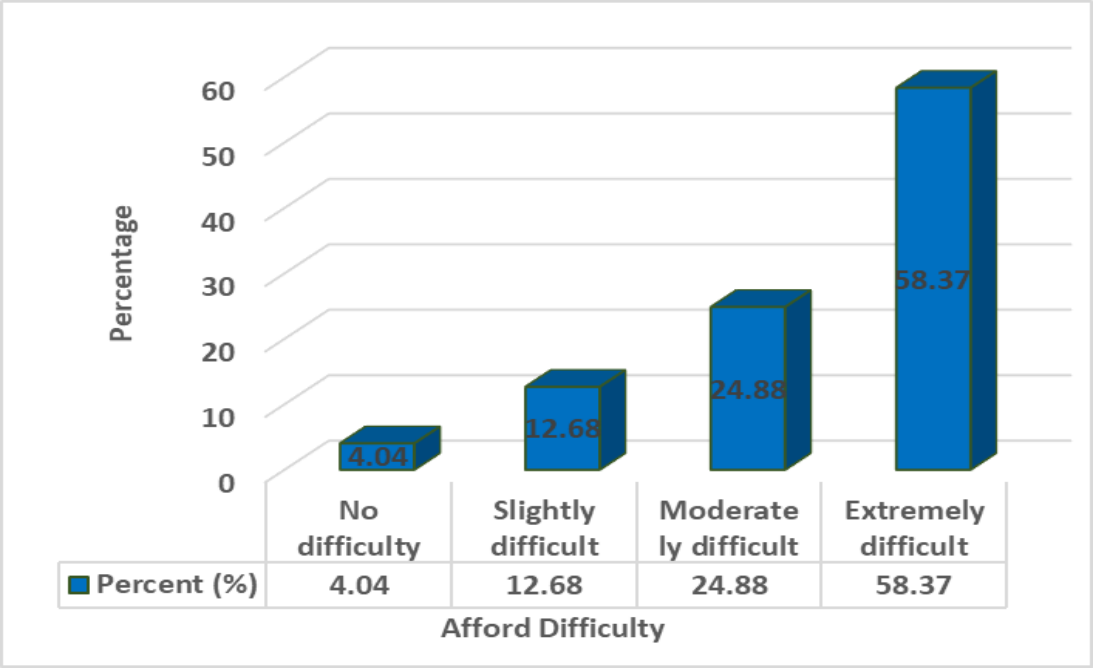


Figure 2: Bar plot of Levels of the Outcome Variable

Table III presents the case processing summary of the categorical variables used in the analysis, providing an overview of the socioeconomic characteristics of the representative households and their perceptions regarding inflation and affordability. The majority of respondents indicated experiencing significant inflationary pressures, with 57.66% perceiving a moderate increase and 39.00% perceiving a high increase in prices. With nearly half (48.80%) earning BDT 10,000–20,000 and only 10.05% earning above BDT 30,000, household income is primarily concentrated in the lower and lower-middle groups. With 46.41% reporting a worsening employment situation and only 16.51% reporting an improvement, labor market conditions seem unstable. Since most people have only completed primary or secondary school and a lesser percentage have completed higher education, educational attainment is skewed toward lower levels. But the distributions of occupation are relatively even across agriculture, daily labor, business, and service sectors. The majority (58.37%) express extreme difficulty in managing expenses of basic necessities, while 24.88% report moderate difficulty. This indicates that most households are experiencing significant financial strain due to inflation and therefore needs immediate attention regarding identifying the main factors contributing to the affordability difficulty in basic necessities.

Table III: The Distribution of Categorical Variables Use

Variable name	Category	Frequency	Percentage (%)

Perceived price increase	No noticeable increase	11	2.63
	Slight increase	3	0.72
	Moderate increase	241	57.66
	High increase	163	39.00
Household income	Less than BDT 10,000	43	10.29
	BDT 10,000 – 20,000	204	48.80
	BDT 20,000 – 30,000	129	30.86
	Above BDT 30,000	42	10.05
Employment instability	Improved	69	16.51
	No change	155	37.08
	Worsened	194	46.41
Education level	No formal education	69	16.51
	Primary education	140	33.49
	Secondary education	93	22.25
	Higher secondary	54	12.92
	Higher education	62	14.83
Occupation types	Agriculture	90	21.53
	Daily labor	101	24.16
	Business	104	24.88
	Service	104	24.88
	Other	19	4.55
Afford difficulty	No difficulty	17	4.07
	Slightly difficult	53	12.68
	Moderately difficult	104	24.88
	Extremely difficult	244	58.37

Source: Author's computation using survey data using STATA

Table IV presents the bivariate Chi-square test of independence. The Chi-square test of independence was used to test whether there was a relationship between each categorical independent variable and the categorical ordinal dependent variable. The test works by comparing the observed frequencies to the expected frequencies. The null hypothesis of the Chi-square test is that there is no relationship between the two categorical variables. This implies that knowing the value of one variable does not help to predict the value of the other variable. The alternative hypothesis is that the variables are dependent. This implies that there is a relationship between the two categorical variables. That is, knowing the value of one variable helps to predict the value of the other variable.

Table IV: Chi-Square Tests of Independence

Factor	Pearson $\chi 2$ Value	df	P-value	Decision
Afford_difficulty and occupation_types	18.9849	12	0.089	Afford difficulty is marginally dependent on the occupation types of the households (weak association).
Afford_difficulty and education_level	29.1959	12	0.004	Afford difficulty is dependent on the education level (statistically significant association).
Afford_difficulty and perceived_price_increase	139.7212	9	0.000	Afford difficulty is dependent on the perceived price increase (strongly significant association).
Afford_difficulty and household_income	36.7379	9	0.000	Afford difficulty is dependent on the household income (statistically significant association).
Afford_difficulty and employment_instability	29.7720	6	0.000	Afford difficulty is dependent on employment instability (statistically significant association).

Source: Author's computation using survey data using STATA

From the output presented in Table IV, the p-values for each pair of dependent and independent variables are each less than the significance level of 5% except for occupation types, which is 8.9%. This leads to the rejection of the null hypothesis in favor of the alternative hypothesis for each pair of variables. Rejecting the null hypothesis means there exist significant relationships between affordability difficulty and each of the categorical independent variables considered in the ordinal regression analysis. In other words, according to the chi-square results, perceived price increases, household income, education level, and job insecurity are all highly correlated with affordability issues and are all statistically significant even at the 1% level. On the other hand, there is only a slight correlation with profession type, which is marginally significant at the 10% level. These results imply that affordability stress is primarily driven by the perceptions of inflation and income limitations, with labor market and educational factors playing significant supporting roles.
Furthermore, Cramer's V, an effect size measurement for the chi-square test of independence, is calculated. It is a standardized measure of association derived from the Pearson Chi square statistic, used to assess strength of relationship between two nominal or ordinal categorical values.

Cramer's V formula:

$$\boldsymbol{V} = \sqrt{\frac{\chi^2}{N \times k}}$$

Where:
$\chi 2$ = Pearson Chi-square statistic
N = total sample size
k= the smaller of number of rows or number of columns $= \min(r-1, c-1)$

Cramer's V ranges from 0 to 1:
0 = no association and 1 = perfect association
Table V: Interpretation of effect size:

Cramer's V	Strength of association
0.00 – 0.10	Very weak / negligible
0.10 – 0.30	Small
0.30 – 0.50	Moderate
> 0.50	Strong

Source: Author's computation using survey data using STATA

Table V shows the strength of association based on the estimated result. Overall, in addition to statistical significance, effect sizes were assessed using Cramer's V to evaluate the strength of association. This allows for a more substantive interpretation of the chi-square results. The result is shown in the following table:

Table VI: Effect size measurement.

Variable	Cramer's V	Effect Strength
Perceived price increase	0.33	Moderate–Strong
Education level	0.15	Small–Moderate
Occupation types	0.12	Small
Household income	0.17	Small–Moderate
Employment instability	0.19	Small–Moderate

Source: Author's computation using survey data using STATA

Using Cramer's V (a standardized measure of effect size), the table VI highlights the degree of association between important socioeconomic characteristics and affordability difficulty. According to Cramer's V effect size study, perceived price increases have the most impact on affordability

difficulties, followed by household income and job insecurity, both of which have small-to-moderate effects. While occupation type only exhibits a small correlation, education degree plays a significant structural role. These results suggest that the perception of inflation is the primary cause of affordability stress, with labor-market and socioeconomic factors serving as secondary modifiers.

The study used White's general heteroskedasticity test, and the Breusch–Pagan/Cook–Weisberg test to determine whether the assumption of constant error variance is met. The result is shown in the following table:

Breusch–Pagan / Cook–Weisberg Test for heteroskedasticity		
Chi-square value	**df**	**p-value**
80.03	17	0.000
White's Test for Heteroskedasticity		
197.65	117	0.000

Table VII: Breusch–Pagan and White Test for heteroskedasticity
Source: Author's computation using survey data using STATA

Both the Breusch-Pagan and White's test for heteroskedasticity yield a chi-square value of 80.03 and 197.65 respectively, with a corresponding p-value of 0.000 in both tests. Since the p-value in both cases is less than the conventional 5% level of significance, it leads to the rejection of the null hypothesis of constant variance, meaning that the variance of error term is not constant across the observations. However, to ensure consistent and reliable statistical inference, this study employs heteroskedasticity-robust standard errors.

B. Ordinal Logistic Regression Analysis

Table VIII provides the model fitting information that contains the likelihood-ratio (LR) chi-square test used to compare the full model against a null (intercept only) model for the ordinal logistic regression model estimated to examine the socioeconomic determinants of household affordability difficulty due to inflation. The likelihood-ratio (LR) chi-square test result, therefore, used to check whether the present model with explanatory variables included is an improvement over the intercept only model or not. At the 5% level of significance, the likelihood-ratio test result is statistically significant, indicating that the final model yields a significantly better fit over the baseline or intercept only model. This finding shows that the model's explanatory power is significantly improved with the

inclusion of socioeconomic factors such household income, occupation type, education level, earning member, and labor market conditions. Moreover, the significance of the chosen explanatory variables in explaining variations in household affordability difficulty supported by the significant chi-square statistic demonstrates that at least one of the regression coefficients in the model is statistically different from zero. In other words, at least one of the explanatory variables has a statistically significant effect on household affordability difficulty. Accordingly, the estimated ordinal logistic model is statistically appropriate for the further interpretations of individual coefficients, odds ratios and marginal effects.

Table VIII: Model Fitting Information for Ordinal Logistic Regression

Model	Log Likelihood	Likelihood-ratio (LR) chi-square	Degrees of Freedom	Prob > χ^2
Intercept-only (Null Model)	-439.91544	—	—	—
Full Model (with predictors)	-368.88706	142.06	17	0.0000

Link function: Logit.

Note: The likelihood-ratio (LR) chi-square statistic tests the null hypothesis that all slope coefficients in the model are jointly equal to zero.

The Pseudo R^2 (McFadden's R^2) presented in table IX is a measure of how well the model explains the variance compared to the baseline mode. However, unlike the R^2 in linear regression model, it does not measure the proportion of variance of explained, rather it indicates model explanatory power. The Pseudo R^2 gives information about how much variance is explained by the explanatory variable included in the ordinal logistic regression model.

Table IX: Pseudo R^2 Measures for Ordinal Logistic Regression

Pseudo R^2 Measure	Value
McFadden's Pseudo R^2	0.1615

Link function: Logit.

Note**:** McFadden's Pseudo R^2 indicates the improvement of the full model over the intercept-only model. In logistic regression, values around 0.1–0.2 are considered satisfactory, indicating reasonable explanatory power.

The Pseudo R^2 value for the ordinal logistic regression model estimated for inflationary effects on households' ability to afford basic necessities

is 0.1615. This indicates that the inclusion of socioeconomic variables improves the model's fit compared to the baseline (intercept only) model by approximately 16.15%. The observed result of the Pseudo R^2 indicates that the model possesses reasonably explanatory power in explaining variations is household afford difficulty due to inflation in the CHT, even though it is typically lower than R^2 in linear regression, confirming that household affordability difficulty is systematically influenced by underlying socioeconomic conditions in the Chittagong Hill Tracts. In simple terms, the model adds information about the household affordability difficulty that the baseline model cannot explain.

Having confirmed that the model demonstrates a statistically significant enhancement over the null model and possesses adequate explanatory power, the analysis now focuses on interpreting individual regression coefficients, odds ratios, and conducting marginal effect analysis to ascertain the specific factors affecting household affordability challenges.

Table X presents the values of the regression coefficients and intercepts, together with the corresponding robust standard errors, z values and their p-values from the estimated ordered logistic regression model examining the impact of inflation and socioeconomic variables on the household affordability difficulty in CHT. The last three rows are the intercepts, sometimes referred to as the cut-points that represent the threshold of the ordinal logistic regression. For the ordinal logistic regression model, there are n-1 intercepts, where n is the number of categories in the dependent variable (afford difficulty). In logistic regression, the intercept can be interpreted as the expected odds of identifying the listed categories when other variables in the model assume a value of zero. It also represents the expected value of the logit (log-odds) of the outcome variable when all explanatory variables are equal to zero. It acts as a baseline, indicating the starting point for predictions before accounting for the effects of independent variables. However, the intercepts are not usually included in the interpretation of the ordinal logistic regression analysis result. The variable with the largest coefficient with p value less than the chosen level of the significance of 0.05 is considered the most significant influential factor. In an ordinal logit framework, positive coefficients indicate a higher likelihood of moving into more severe affordability difficulty categories, while negative coefficients indicate a lower likelihood, holding other variables constant.

Table X: Parameter Estimates of the Ordinal Logistic Regression Model

Variable	Category	Value	Robust Std. Err.	P-value	95% Confidence Interval
Earning member	+1 member	-.2005923	.187045	0.284	[-0.567, 0.166]
Employment instability	No change Worsened	.5852998 1.262508	.3159897 .3110865	0.064 0.000	[-0.034, 1.205] [0.653, 1.872]

Perceived price increase	Slight increase Moderate increase High increase	-1.697958 2.279647 3.94915	2.442851 .9728649 .9921139	0.487 0.019 0.000	[-6.486, 3.090] [0.373, 4.186] [2.004, 5.894]
Household income	BDT 10,000 - 20,000 BDT 20,000 - 30,000 Above BDT 30,000	-.3294586 -1.01531 -1.623982	.4455492 .4906319 .560672	0.460 0.039 0.004	[-1.203, 0.544] [-1.977, -0.054] [-2.723, -0.525]
Education level	Primary education Secondary education Higher secondary Higher education	-.2554904 -.5524934 -.6189558 .1372587	.3914894 .4399186 .4657638 .5037736	0.514 0.209 0.184 0.785	[-1.023, 0.512] [-1.415, 0.310] [-1.532, 0.294] [-0.850, 1.125]
Occupation types	Daily labor Business Service Other	.1972178 .0923849 .1110443 -.1674085	.3701071 .3999428 .4167806 .4968558	0.594 0.817 0.790 0.736	[-0.528, 0.923] [-0.691, 0.876] [-0.706, 0.928] [-1.141, 0.806]
Intercepts	1/2 2/3 3/4	-1.375992 .4920809 2.104348	1.058746 1.090558 1.100107		[-3.451, 0.699] [-1.645, 2.630] [-0.052, 4.261]

Source: Author's computation using survey data using STATA

The results demonstrate that the labor market condition is a significant factor influencing affordability problems. Families reporting worsening employment conditions have a positive and highly significant coefficient even at the 1% significance level ($\beta = 1.263$, $p < 0.01$) compared to families whose employment improved (the reference category), indicating a significantly increased risk of suffering more severe affordability difficulties. Additionally, households with no change in employment have a marginally significant ($p < 0.10$) positive coefficient, indicating a slight increase in vulnerability in comparison to the reference group. The positive direction indicates that employment stagnation during inflation still worsens household welfare relative to improvement.

The most significant explanatory factor is perceived price increases. Households with moderate price increases have a positive and statistically significant coefficient ($\beta = 2.280$, $p < 0.05$) compared to households with no noticeable price increase, while households with high price increases have an even larger and highly significant coefficient ($\beta = 3.949$, $p < 0.01$). These findings point to a significant increase in affordability challenges when inflation rises. Accordingly, once inflation passes a threshold, it rapidly erodes purchasing power. Conversely, small price increases do not have a statistically significant impact, suggesting that families are comparatively resistant to small price fluctuations.

However, a significant protective effect is shown by household income. Households earning between BDT 20,000 and BDT 30,000 had a significant negative coefficient ($\beta = -1.015$, $p < 0.05$) compared to the lowest income group, whereas households earning more than BDT 30,000 have an even bigger

and very significant negative coefficient ($\beta = -1.624$, $p < 0.01$). According to these results, households with higher incomes are much less likely to face serious affordability issues. The coefficient for the BDT 10,000–20,000 income group is negative but statistically insignificant, suggesting limited protection at lower income transitions.

On the other hand, there are no statistically significant coefficients for earning members, occupation type, and education level. The lack of statistical significance indicates that these variables do not independently influence affordability difficulty once inflation, income, and employment conditions are taken into account, even though several categories show expected negative indicators, especially for higher education levels.

The table X also presents the confidence intervals for the parameter estimates. The parameter estimate under consideration is statistically significant if the confidence interval (CI) does not include or cross zero (0). From the table, apart from the CI of earning members, occupation types, education level, no change in employment conditions, and a slight price increase (which includes 0), the confidence interval for each of the other categories of the independent variables did not include or crossed 0. This confirms the result presented above.

Overall, the coefficient estimates show that while demographic and behavioral factors have a minor impact, the main causes of household affordability difficulties are inflation severity, income limitations, and employment decline.

A more logical interpretation of effect magnitudes is provided by table XI, which displays the odds ratios corresponding to the ordered logistic regression estimates. The odd ratios are strictly in line with the proportional odds assumption which posits that the effect of each explanatory variable is identical across all cumulative splits of an ordered outcome (dependent variable). That is, for ordinal logistic regression, there are separate intercept terms at each threshold, but a single odds ratio. Thus, the odds ratios are interpreted as follows: an odds ratio greater than one indicates increased odds of falling into higher affordability difficulty categories, while an odds ratio less than one indicates reduced odds.

Table XI: Odd Ratios and Confidence Intervals new

Variable	Category	Odd Ratio	P-value	95% Confidence Interval
Earning member	+1 member	.8182459	0.284	[0.567, 0.181]
Employment instability	No change Worsened	1.795529 3.534275	0.064 0.000	[0.967, 3.335] [1.921, 6.503]
Perceived price increase	Slight increase Moderate increase High increase	.183057 9.773234 51.89122	0.487 0.019 0.000	[0.002, 21.976] [1.452, 65.787] [7.423, 362.7294]

Household income	BDT 10,000 - 20,000 BDT 20,000 - 30,000 Above BDT 30,000	.719313 .36229 .1971122	0.460 0.039 0.004	[0.300, 1.723] [0.138, 0.948] [0.066, 0.592]
Education level	Primary education Secondary education Higher secondary Higher education	.7745366 .575513 .5385064 1.147125	0.514 0.209 0.184 0.785	[0.360, 1.668] [0.243, 1.363] [0.216, 1.342] [0.428, 3.079]
Occupation types	Daily labor Business Service Other	1.218009 1.096787 1.117444 .845854	0.594 0.817 0.790 0.736	[0.590, 2.516] [0.501, 2.402] [0.494, 2.529] [0.319, 2.240]

Source: Author's computation using survey data using STATA

The odds ratio for worsened employment conditions and no change in employment category of employment conditions is 3.53 and 1.80 respectively. Compared to the reference group, households with worsened employment conditions are almost 3.53 times more likely to struggle with higher affordability difficulty ($p < 0.01$), holding constant all other categories and variables. While households with no change in employment are 80% more likely to experience higher affordability difficulty than those with improved employment, although this effect is only marginally significant. This result confirms the consistency with the coefficient results that the deterioration in employment condition significantly raises household vulnerability.

Perceived price inflation odds ratios show a very large and nonlinear effect. The odds ratio for moderate price increases and high increase categories is 9.8 and 52 respectively. Compared to households reporting no price increase, households experiencing moderate price increases are over 9.8 times more likely to have higher affordability difficulties ($p < 0.05$), holding constant all other categories and variables. Whereas households experiencing severe price increases are more than 50 times more likely ($p < 0.01$), given that all of the other categories and variables in the model are held constant. These findings suggest that once inflation exceeds modest levels, the difficulty of affordability increases significantly. However, slight price increases do not significantly alter the odds of severe affordability difficulty.

The odds ratio for households earning BDT 20,000–30,000 and households earning above BDT 30,000 categories are 0.36 and 0.8 respectively. Compared to the lower income groups, households earning BDT 20,000–30,000 experience a 64% reduction in the odds of severe affordability difficulty, while households earning above BDT 30,000 experience an even higher reduction of 80%, given that all of the other categories and variables in the model are held constant. These findings affirm the strong buffering role of income against inflation induced hardship that household income significantly reduces the vulnerability.

On the other hand, the odds ratios for earning members, education level, and occupation type continue to be almost equal to unity and statistically insignificant. This suggests that once underlying economic

factors are taken into consideration, differences in occupation, educational achievement, or earning members do not significantly change the chance of severe affordability difficulties. Overall, the findings confirm that affordability difficulty is systematically driven by inflation-induced price and income shocks rather than demographic characteristics alone, providing strong empirical support for inflation effects to afford basic necessities.

Taken together, both coefficients and odds ratios interpretations offer solid and consistent proof that household affordability challenges in the Chittagong Hill Tracts are jointly driven by inflation-induced price and income shocks, labor market unstable, rather than only by demographic factors, hence offering robust empirical validation for the inflationary effects. The convergence of coefficient estimates and odds ratios strengthens the reliability of the findings, and provides a strong basis for the marginal effects analysis and the policy debate that follows.

A Marginal Effect represents the instantaneous change in the probability of falling into a particular ordered category for a one-unit increase in a predictor, holding other variables constant, overcoming the lack of direct interpretability of raw coefficients. Marginal effects are indispensable to interpret parameters in nonlinear models. It expresses changes in probabilities for each outcome level, often using Average Marginal Effects (AME). The AMEs were calculated for important inflation-related variables in order to strengthen the interpretability of the ordinal logistic regression results. With the regression coefficients and odds ratios indicating the direction and relative strength of associations, marginal effects modify these ties into changes in anticipated probabilities, which are more understandable and pertinent to policy. The following table shows the average marginal effects of perceived price inflation, household income and labor market conditions on the likelihood of households having severe affordability difficulty.

Table XII: Average Marginal Effects of Perceived Price Increase

Perceived Price Increase (ppi)	Average Marginal Effect (dy/dx)	Robust Std. Error	z-value	p-value	95% Confidence Interval
Slight increase	–0.0807	0.0953	–0.85	0.397	[–0.268,0.106]
Moderate increase	0.3716	0.0880	4.22	0.000	[0.199, 0.544]
High increase	0.6952	0.0905	7.68	0.000	[0.518, 0.873]

Source: Author's computation using survey data using STATA.

The average marginal effects analysis reveals a strong and nonlinear relationship between price inflation and extreme affordability difficulty. Moderate price rises increase the probability of serious affordability trouble by about 37 percentage points, although modest price increases have little effect on the likelihood of severe hardship. High price inflation raises the likelihood of extreme difficulties by about 70 percentage points, making the effect much more noticeable. These results demonstrate that price inflation is the dominant driver of extreme affordability hardship among households in the

Chittagong Hill Tracts and show a distinct inflation threshold beyond which households quickly enter acute economic suffering, strengthening the above coefficients and odds ratios findings.

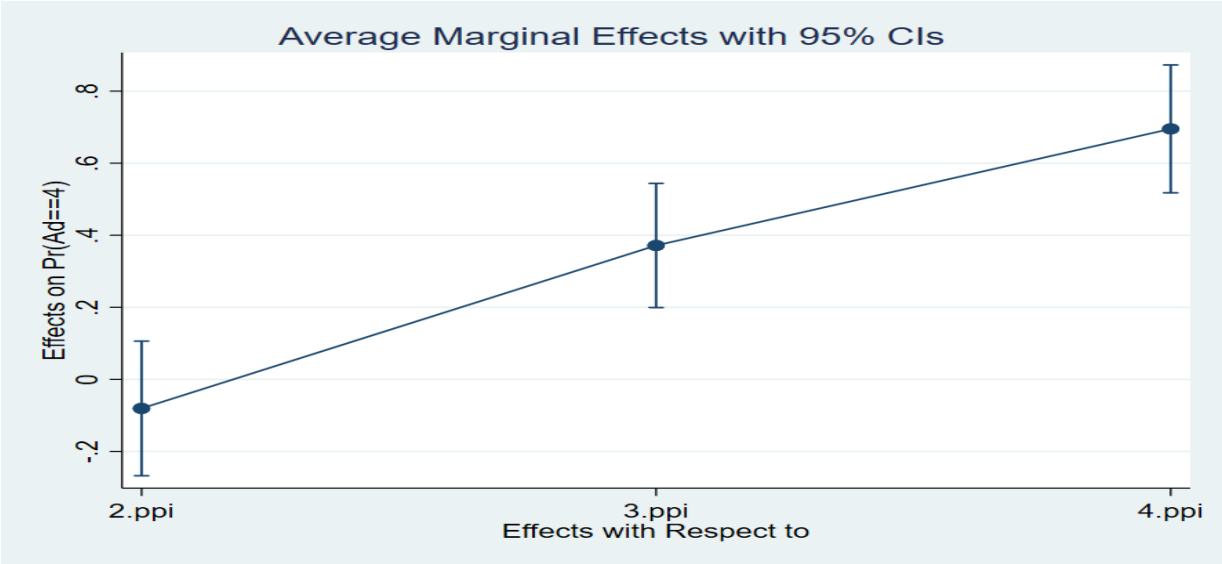


Figure 4.2: Average Predicted Probability of Extreme Affordability Difficulty by Level of Perceived Price Increase.

Figure 4.2 depicts the average anticipated likelihood of families encountering severe affordability challenges at varying degrees of perceived price increase. The figure displays a comparatively low and steady probability with households reporting no or slight price increases. However, the probability rises sharply for households experiencing moderate price increases and increases further under high price inflation, confirming that severe affordability difficulty emerges predominantly among marginalized communities in CHT when adverse price shock reaches moderate to high levels.

Table XIII: Average Marginal Effects of Household Income

Household Income (hi)	Average Marginal Effect (dy/dx)	Robust Std. Error	z-value	p-value	95% Confidence Interval
BDT 10,000 – 20,000	–0.0572	0.0748	–0.77	0.444	[–0.204, 0.089]
BDT 20,001 – 30,000	–0.1861	0.0842	-2.21	0.027	[–0.351, –0.021]
Above BDT 30,000	–0.3018	0.0966	–3.12	0.002	[–0.491, –0.112]

Source: Author's computation using survey data using STATA.

The average marginal effects of household income demonstrate a distinct and consistent protective correlation against severe affordability challenges among the marginal communities. Households with middle-class and higher-class incomes see large and statistically significant reductions in the

likelihood of experiencing severe hardship, whereas small increases in income at lower levels do not lead to significant reduction in the probability. Specifically, compared to the poorest households, households earning more than BDT 30,000 are about 30 percentage points less likely to experience severe affordability difficulties, supporting the idea that income of the marginalized peoples serves as a crucial buffer against inflationary pressures, with the protective benefits becoming more noticeable at higher income levels as shown in the following figure.

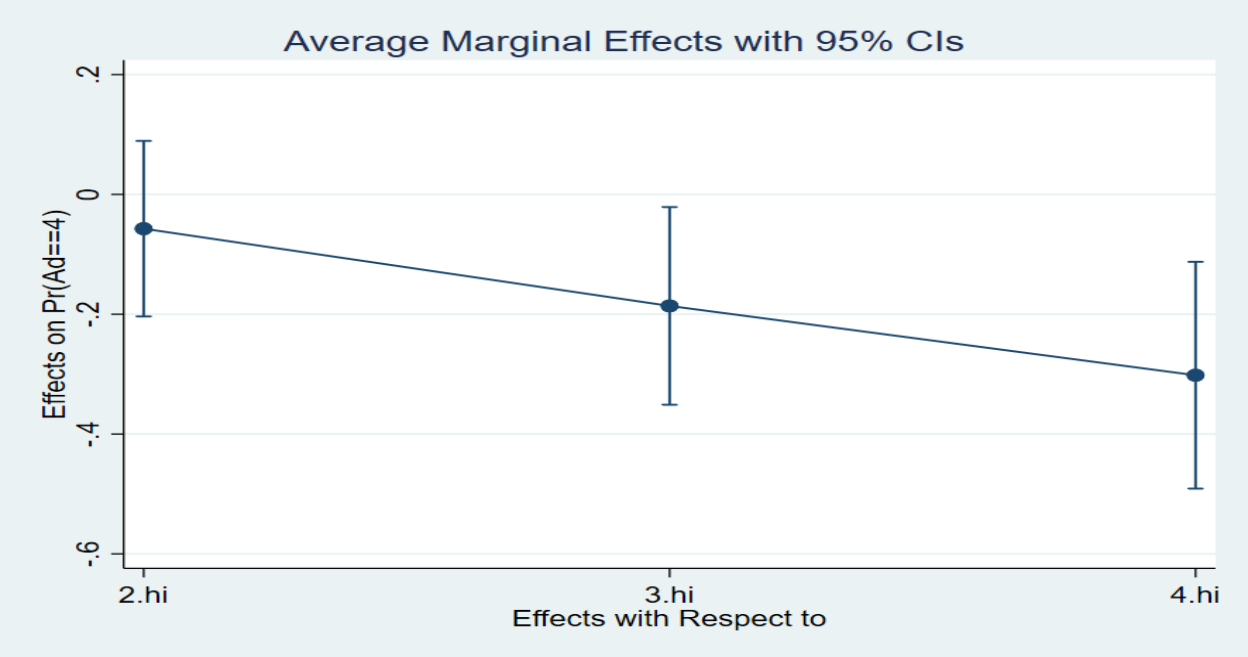


Figure 4.3: Average Predicted Probability of Extreme Affordability Difficulty by Household Income Level

The figure 4.3 shows a high probability of experiencing extreme hardship among households in the lowest income group, which gradually decreases as income rises. This visual pattern demonstrates a monotonic and nonlinear protective effect of income, showing that higher household income significantly reduces vulnerability to inflation-induced affordability stress of the marginalized communities in the CHT.

Table XIV: Average Marginal Effects of Employment Impact

Employment Impact (ei)	Average Marginal Effect (dy/dx)	Robust Std. Error	z-value	p-value	95% Confidence Interval
No change	0.1129	0.0599	1.88	0.060	[–0.005, 0.230]
Worsened	0.2383	0.0573	4.16	0.000	[0.126, 0.351]

Source: Author's computation using survey data using STATA.

The average marginal effects of employment on extreme affordability difficulty exhibit a distinct escalation pattern. The likelihood of experiencing extreme hardship is somewhat increased (11.3 percentage point) by employment stagnation, while it is significantly increased by approximately 24 percentage points by employment deterioration. The results show that adverse employment shocks push households quickly into extreme affordability difficulty rather than just gradually worsening household conditions. These findings emphasize how inflation increases household vulnerability among marginalized people in the Chittagong Hill Tracts through employment instability, which is a crucial transmission channel, as shown in the following figure.

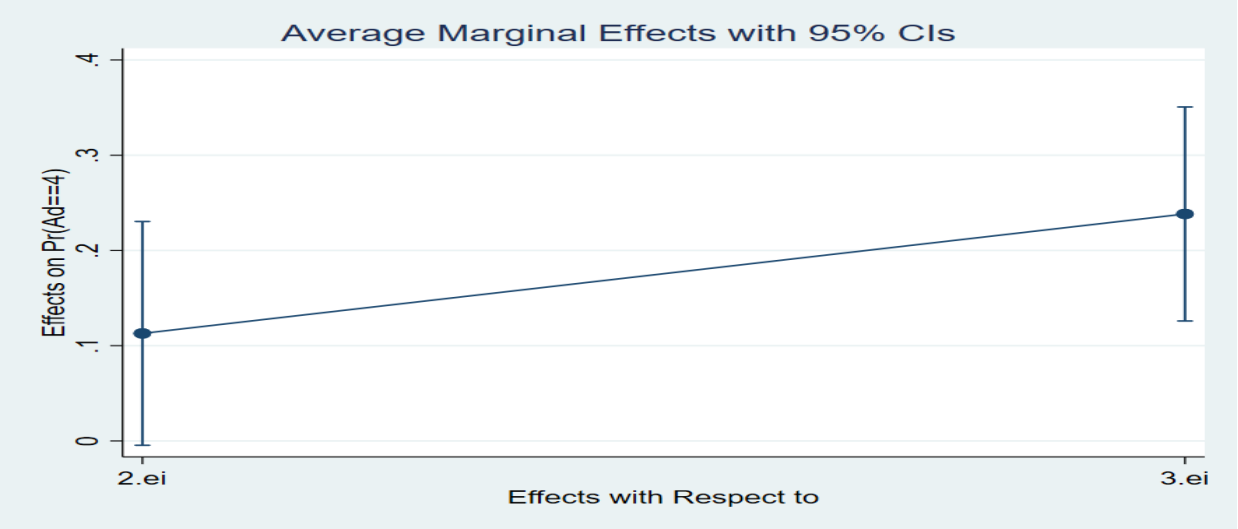


Figure 4.4: Average Predicted Probability of Moderate and Extreme Affordability Difficulty by Employment Impact

Figure 4.4 depicts the movement of families across affordability difficulty categories when labor market conditions change. This graphic pattern supports a distinct escalation mechanism in which households move from moderate hardship to significant affordability trouble as a result of inflation-induced employment shocks, and emphasizes employment instability as a primary cause of extreme household vulnerability of the marginalized peoples of the CHT.

The marginal effects analysis, shown in table XV, reveals that households with a greater number of income earners and moderate educational attainment (from primary to higher secondary) exhibit a reduced likelihood of facing severe financial hardship, although these effects are not statistically significant. On the other hand, higher education and employment types have inconsistent and insignificant effects on affordability. Overall, the findings imply that while occupation alone is less predictive, household earning capacity and education may offer some resilience against extreme financial distress. These patterns are consistent with theoretical predictions, emphasizing the potential contribution of household structure and human capital to reducing extreme financial vulnerability.

Table XV: Marginal Effects of Earning members, Education level and Occupation types

Variable	Category	dy/dx	p-value
Earning Members	+1 member	-0.0361	0.283
Education Level	Primary education	-0.0455	0.509
	Secondary education	-0.0999	0.203
	Higher secondary	-0.1121	0.178
	Higher education	0.0237	0.785
Occupation Type	Daily labor	0.0355	0.595
	Business	0.0167	0.817
	Service	0.789	0.789
	Other	0.736	0.736

Source: Author's computation using survey data using STATA.

C. Checking Assumptions for Ordinal Logistic Regression Model

Like every statistical analysis, there are some presumptions that have to be fulfilled in order for the fitted ordinal logistic regression model's results to be applicable and generalized. The following tests and verifications were therefore performed to make sure that the data did not violate those presumptions and to guarantee the validity of the fitted model.

1.The dependent variables are ordered: The first and crucial presumption of the ordinal logistic regression is that the dependent variable must be sorted in order. This assumption is satisfied by the dataset used in this study since the dependent variable, afford difficulty, was classified to show the natural category ordering that represents households afford difficulty as no difficulty, slightly difficult, moderately difficult, and extremely difficult.

2. One or more of the explanatory variables are continuous, categorical or ordinal: The second assumption is that one or more of the regressors are either continuous, categorical or ordinal. This assumption is also satisfied as there is one continuous independent variable called earning member, four categorical independent variables called perceived price increase, household income, employment instability, and education level, and one ordinal independent variable occupation types.

3. No multi-collinearity: Multicollinearity occurs when the model includes multiple independent variables that are correlated with each other. The variance inflation factor (VIF) test is normally used to check for multicollinearity among explanatory variables used in an analysis. High multicollinearity can inflate the standard errors and erode the statistical significance of the regression coefficients. A VIF value greater than 10 implies there is serious multi-collinearity, and the VIF results are shown in the following table.

Table XVI: VIF Test to Check Multicollinearity

Variable	VIF	Mean VIF
perceived_price_increase	1.06	1.36
household_income	1.40	
earning_members	1.26	
employment_instability	1.04	
occupation_type	1.68	
education_level	1.71	

Source: Author's computation using survey data using STATA.

The VIF results indicate that none of the VIF values of explanatory variables is greater than the commonly accepted threshold of 10, suggesting that multicollinearity is not a concern in the estimated model. Therefore, the assumption of no multicollinearity is satisfied. The mean VIF value of 1.36 further confirms that multicollinearity is not a serious issue in the model. Consequently, the computed coefficients may be regarded as stable and unaffected by significant linear dependence among the regressors.

4.The odds are proportional (proportional odds or Parallel lines assumption): One of the key assumptions of ordinal logistic regression model is the proportional odds or parallel lines assumption which posits that the effect of each explanatory variable is identical across all cumulative splits of an ordered outcome. Likelihood-Ratio (LR) test of the proportional odds was carried out to test if the parallel assumption holds in the estimated model. The null hypothesis is that the parallel assumption holds, and it will hold only for p-value greater than the chosen significant value of 0.05.

Table XVII: Approximate likelihood-ratio test of proportionality of odds across response categories.

Chi-square value	df	p-value
19.84	12	0.0701

Source: Author's computation using survey data using STATA.

The test results as shown in the above table fail to reject the null hypothesis at the 5 percent significance level, indicating that the proportional odds assumption is satisfied. Consequently, the estimated coefficients can be interpreted as having a constant effect across different levels of affordability difficulty, and the ordinal logistic regression model is suitable for examining household affordability difficulty.

5. Result and Discussion

This research analyzed the socioeconomic factors influencing household affordability challenges in the Chittagong Hill Tracts with an ordinal logistic regression model. The model diagnostics confirm that the estimated model is statistically sound and well specified. An intercept-only model's null hypothesis is substantially rejected by the likelihood ratio chi-square test, suggesting that adding explanatory variables greatly enhances model fit. Additionally, the pseudo R^2 value further indicates that the model explains a meaningful proportion of variation in household affordability difficulties. This model also validates the assumptions of the ordered logistic regression model, as shown by the Variance Inflation Factor (VIF) test and the proportional odds (PO) assumption test.

The findings suggest that inflation-related economic shocks are the primary factors influencing household affordability challenges in the Chittagong Hill Tracts. The empirical results constantly indicate that price inflation is the dominant factor affecting household affordability challenges. Both the coefficient estimates and the average marginal effects demonstrate a substantial, positive, and nonlinear relationship between inflation severity and extreme affordability hardship. Moderate and high price increases significantly increase the likelihood of experiencing extreme affordability difficulties, whereas slight price increases have little effect on household welfare, suggesting the existence of critical inflation thresholds beyond which household resilience quickly declines.

One significant protective factor against extreme affordability stress is household income. Extreme affordability difficulties are far less likely to occur in higher income categories, while the amount of the marginal effects gradually increases at higher income levels. This trend demonstrates that low-

income households are disproportionately exposed to welfare losses caused by inflation and draws attention to the uneven burden of inflation across income categories.

Employment conditions significantly influence household vulnerability. While stable employment conditions lessen susceptibility, deterioration in the labor market conditions greatly raises the likelihood of serious affordability difficulties. These findings indicate that employment shocks serve as a key mechanism through which inflation causes severe household hardship among the marginalized communities in the CHT.

On the other hand, after controlling for price, income, and employment effects, factors including education level, occupation type, and household earning member indicate little explanatory power. Higher education and earning members exhibit somewhat protective tendencies, but their impacts are statistically negligible, indicating that demographic characteristics are not enough to offset severe macroeconomic pressures. The supremacy of economic exposure over occupational categorization is further supported by the fact that profession type has no independent effect on extreme affordability problems.

Overall, the findings present compelling evidence that the severity of inflation, income limitations, and employment uncertainty collectively contribute to household affordability challenges in the Chittagong Hill Tracts. The results highlight the shortcomings of coping strategies at the family level and stress the necessity of structural and policy-based reforms to lessen inflation-induced welfare losses. These insights emphasize the necessity of price stabilization, income support, and employment protection measures to mitigate inflation's adverse effects on vulnerable households of the marginalized communities in the CHT.

This study's findings align with current literature about the socioeconomic effects of inflation on household wellbeing, while also providing context-specific insights for the Chittagong Hill Tract. In alignment with the findings of (Islam et al., 2025) , which indicate that elevated food prices markedly exacerbate food insecurity, and forces coping strategies (e.g., reduced consumption, borrowing), particularly among low-income households, and with the findings of (Hossain & Mujeri, 2020), which show that even a small price increase can force low-income households into difficult choices, this study reveals that moderate and high perceived price increases significantly heighten the probability of severe affordability difficulties. The protective function of higher income in alleviating welfare difficulties corresponds with extensive consumer research (Saha & Kar, n.d.), which suggests that inflation erodes real purchasing power, compelling households to modify consumption habits or accumulate debt. Research by (Abada et al., 2021) confirms that inflation and unemployment negatively affect household consumption and economic welfare, consistent with findings that rising prices and worsened employment conditions raise household hardship, highlighting the significance

of income and labor market conditions in shaping welfare outcomes. Research from rural Bangladesh (Akter & Basher, 2014) indicates that sudden increases in food prices disproportionately affect the food security of impoverished households, hence exacerbating the distributional vulnerability identified among marginalized groups in this study. The statistically insignificant impacts of education and career contrast with previous studies that indicate robust correlations between human capital and household welfare. However, this divergence can be explained by the short-term nature of inflationary shocks. Although education and employment enhance long-term economic outcomes, the immediate burden of escalating prices seems to overshadow these structural benefits. This finding corroborates recent literature suggesting that macroeconomic shocks can temporarily negate the potential benefit of human capital, as evidenced by studies indicating that short-term economic shocks exert unique and occasionally subdued effects on educational and human capital outcomes relative to their long-term impact (Frankenberg & Thomas, 2017). Overall, the discussion indicates that the study's findings align predominantly with existing literature, emphasizing the preeminence of inflation-related economic factors over demographic characteristics in influencing household affordability outcomes, especially in marginalized regions like the Chittagong Hill Tracts.

6.Conclusion and Policy Recommendations

6.1 Conclusion

The results of this study indicate that the difficulties of household affordability in the Chittagong Hill Tracts are predominantly influenced by macroeconomic factors, specifically the intensity of inflation and employment volatility, rather than solely by demographic or household-level attributes. The triviality of education, employment, and financial management underscores that structural economic shocks can surpass individual resilience and human capital benefits in the short term. Consequently, policy responses should emphasize macroeconomic stabilization and income protection measures, particularly for low-income and vulnerable households.

6.2 Policy Recommendations

i. Empirical findings demonstrate that moderate to significant perceived price rises substantially elevate the likelihood of serious affordability challenges, whereas marginal effects suggest that severe inflation can amplify the chance of hardship by approximately 70 percentage points. Consequently, in light of the significant impact of inflation on affordability challenges, policy measures that strengthen market surveillance, improved supply chain logistics, and mitigate speculative price increases can safeguard household welfare and avert descents into severe hardship. This will ensure access to affordable food (SDG 2), and promotes stable and efficient markets (SDG 12).

ii. The findings indicate that deteriorated employment conditions substantially elevate the probability of severe affordability difficulty by more than 23 percentage points, establishing employment stability as a crucial conduit between inflation and household well-being. To address this, a targeted wage insurance program for informal and seasonal workers in the Chittagong Hill Tracts (CHT) could be implemented, providing 50–70% of lost wages for up to six months during periods of job disruption or inflationary shocks. This program would stabilize household purchasing power, reduce the likelihood of severe affordability challenges, and ensure that vulnerable households can meet basic necessities. By protecting incomes in marginalized communities, this policy directly contributes to SDG 1 (No Poverty) and enhances SDG 8 (Decent Work and Economic Growth) by maintaining labor market participation and resilience to economic disruptions.

iii. Increased income levels markedly diminish the likelihood of severe affordability difficulty, with households earning above BDT 30,000 exhibiting around a 30 percentages point reduced risk relative to the lowest income group. Targeted interventions by government: vocational training, microfinance, and conditional cash transfers — can empower low-income households to more effectively endure inflationary shocks, and these programs should be geographically customized for remote and marginalized areas like the Chittagong Hill Tracts. This policy aligns with SDG 1, SDG 8, and SDG 10.

iv. The observed nonlinear inflation impacts in the model underscore the necessity of early action prior to households experiencing severe affordability difficulty. So, the government should design institutional structures that connect inflation monitoring to social policy triggers to ensure prompt interventions that minimize the delay between increasing inflation and policy support. For instance, pricing indices could autonomously trigger targeted assistance when inflation exceeds significant thresholds. Efficient data systems and institutional collaboration facilitate adaptive governance (SDG 17), while dynamic policy responses bolster community resilience (SDG 11).

Overall, the policy implications highlight the fact that long-term human capital development is not the only way to address household affordability stress. Rather, targeted income and employment support along with short-term macroeconomic stabilization are necessary for effective responses. Aligning these interventions with the SDGs ensures consistency between national policy actions and global development commitments.

References:

Abada, F., Manasseh, C., Okanya, O., G. Nwonye, N., Mabel Nwekwo, N., E. Shimmah, S., & Paseda, O. (2021). Impact of Unemployment, Inflation and Households Consumption on Economic Growth. *International Journal of Business and Economics Research*, *10*(6), 258. https://doi.org/10.11648/j.ijber.20211006.16

Akter, S., & Basher, S. A. (2014). The impacts of food price and income shocks on household food security and economic well-being: Evidence from rural Bangladesh. *Global Environmental Change*, *25*, 150–162. https://doi.org/10.1016/j.gloenvcha.2014.02.003

Alam, S. A., Liu, S. X., & Pörtner, C. C. (2024). Navigating food price shocks in a pandemic: Food insecurity and coping mechanisms in Burkina Faso. *World Development*, *182*, 106714. https://doi.org/10.1016/j.worlddev.2024.106714

AMINU, F. O. (2023). Agrarian Households Vulnerability to Food Insecurity in Ogun State Nigeria. *Journal of Agriculture, Food, Environment and Animal Sciences*, *4*(2), 214–229.

Cost-of-living crisis. (2025). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Cost-of-living_crisis&oldid=1324154114

Deaton, A. (2016). Measuring and Understanding Behavior, Welfare, and Poverty. *The American Economic Review*, *106*(6), 1221–1243. https://www.jstor.org/stable/43861121

Delbiso, T. D., Asfaw, F. M., Moges, T., Ero, D., & Kotecho, M. G. (2024). Food insecurity among low-income households in Addis Ababa, Ethiopia. *Heliyon*, *10*(8), e29633. https://doi.org/10.1016/j.heliyon.2024.e29633

Easterly, W., & Fischer, S. (2001). Inflation and the Poor. *Journal of Money, Credit and Banking*, *33*(2), 160–178. https://doi.org/10.2307/2673879

Ernst Engel. (1857). Engel's law. In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Engel%27s_law&oldid=1332997980

Eşer Durmaz, S., Keser, A., & Ergenç, C. (2025). A multidimensional scale for evaluating food inflation's impact on nutritional behavior. *BMC Public Health*, *25*(1), 2298. https://doi.org/10.1186/s12889-025-23553-y

Frankenberg, E., & Thomas, D. (2017). Human Capital and Shocks: Evidence on Education, Health, and Nutrition. In *The Economics of Poverty Traps* (pp. 23–56). University of Chicago Press.

https://www.nber.org/books-and-chapters/economics-poverty-traps/human-capital-and-shocks-evidence-education-health-and-nutrition

Gemechu, D. B., & Elifas, L. O. (2025). Ordinal Logistic Regression Model in Determining Factors Associated with Household Food Insecurity in Namibia. *Open Journal of Statistics*, *15*(3), 272–293.

Greene, W. H. (2003). *Econometric Analysis*. Prentice Hall.

Hasan, A. B. M. N., Luky, M. I. J., Rashid, F., Khanam, M. M., Hossain, J., Rabeya, M. R., & Sharif, A. B. (2025). Household food security and its influence on psychological well-being: A cross-sectional study among adults in slums in Bangladesh. *BMJ Open*, *15*(5), e091640. https://doi.org/10.1136/bmjopen-2024-091640

Headey, D. D., & Martin, W. J. (2016). The Impact of Food Prices on Poverty and Food Security. *Annual Review of Resource Economics*, *8*(Volume 8, 2016), 329–351. https://doi.org/10.1146/annurev-resource-100815-095303

Hossain, M., & Mujeri, M. K. (2020). Inflation and Household Welfare: Evidence from Bangladesh. In M. Hossain (Ed.), *Bangladesh's Macroeconomic Policy: Trends, Determinants and Impact* (pp. 19–49). Springer. https://doi.org/10.1007/978-981-15-1244-5_2

Islam, Md. S., Hossain, Md. A., Shohag, Md. R. K., & Siddiquee, M. S. H. (2025). Implications of high food inflation on food security in urban slum households in Bangladesh. *SN Business & Economics*, *5*(5), 42. https://doi.org/10.1007/s43546-025-00813-y

J. Scott Long & Jeremy Freese. (2014). *Stata Bookstore: Regression Models for Categorical Dependent Variables Using Stata, Third Edition*. https://www.stata.com/bookstore/regression-models-categorical-dependent-variables/?utm_source=chatgpt.com

Majumder, S., Bala, B. K., & Hossain, M. A. (n.d.). *Food Security of the Hill Tracts of Chittagong in Bangladesh*. Retrieved 21 January 2026, from https://dx.doi.org/10.1080/19390459.2012.664019

Nasir, Muhammad, Kishwar, Shabana, Meyer, Moritz, & Barriga-Cabanillas, Oscar. (2025, January 2). *Losing to Inflation: Unmasking the Unequal Price Burden*. https://openknowledge.worldbank.org/entities/publication/8197296e-0c98-4383-bc4f-d73aa0ef22c2?utm_source=chatgpt.com

Ravallion, M., & Ravallion, M. (2016). *The Economics of Poverty: History, Measurement, and Policy*. Oxford University Press.

Ragab Mahmoud, A. (2025). *The Impact of Inflation on Purchasing Power and Living Standards*. https://doi.org/10.13140/RG.2.2.32616.74241

Rahman, A., & Ali, M. (2019). Transforming ethnic conflict and building peace in the Chittagong Hill Tracts, Bangladesh. *Journal of Living Together*, *6*(1), 110–132.

Rahman, K. M. M., Islam, M. M., Hassan, M. F., & Pervin, S. (2024). Assessing Food Security for the People of Chittagong Hill Tracts (CHT): Challenges to Attain SDG 1 and SDG 2. *Bangladesh Journal of Agricultural Economics*. https://doi.org/10.22004/ag.econ.348163

Saha, A., & Kar, D. (n.d.). IMPACT OF INFLATION ON CONSUMPTION PATTERN OF HOUSEHOLDS IN INDIA. *Financial Markets*, 88.

Sen, A. (2014). Development as freedom (1999). *The Globalization and Development Reader: Perspectives on Development and Global Change*, *525*.

Summary | Effects of Inflation on the Livelihoods of Poor Households in Bangladesh. (n.d.). *SANEM*. Retrieved 21 January 2026, from https://sanemnet.org/summary-effects-of-inflation-on-the-livelihoods-of-poor-households-in-bangladesh/

UNCTAD (Ed.). (2021). *The least developed countries in the post-COVID world: Learning from 50 years of experience*. United Nations Publications.

Ziegelhofer, Z. (n.d.). *Food prices and household welfare: A pseudo panel approach*.