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Consumption Weighting and Inflation Inequality across Household Groups: Evidence from Malawi

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Abstract

Households with different consumption baskets can face different inflation exposure even under common national category price changes, which matters when transfers and poverty lines are adjusted using a single index. Using three waves of Malawi's Integrated Household Survey, we compare six household-group contrasts over a moderate-inflation period in 2016–2019 and a high-inflation period in 2019–2024 under equal-household democratic and expenditure-weighted plutocratic aggregation. Under the household-oriented democratic measure, bottom-quintile, rural, below-primary-education, and female-headed households have higher exposure in both periods. Plutocratic aggregation widens all four gaps because higher-spending households within groups generally hold baskets exposed to slower price growth, and this gradient is weaker among the more exposed groups. It also reverses the age comparison in both periods. Food accounts for most of the expenditure, residence, and education gaps, while housing, water and energy is central to female headship gap. Thus, the main socioeconomic pattern is robust, but gap magnitudes and some demographic conclusions depend on how households are weighted. The aggregation rule should therefore be stated when reporting group inflation.

Keywords: Inflation inequality, Household consumption, Malawi, Cost-of-living index, Consumer heterogeneity, Price index aggregation

JEL Classification: C43 , D12 , D31 , E31 , I32 , O15

1 Introduction

Households can face different inflation exposure even when they face the same category-level price changes because their consumption baskets differ. This heterogeneity is commonly described as inflation inequality (Jaravel 2021). It is especially consequential where poverty is widespread and household budgets are concentrated in necessities, because increases in food or housing costs place greater pressure on households with little room to adjust their spending. Malawi provides such a setting (National Statistical Office of Malawi 2020; World Bank 2023).

Inflation-exposure gaps matter whenever transfers, wages, poverty lines, or nominal consumption are adjusted using a common price index. Indexation to headline inflation may provide less protection for groups whose exposure exceeds that benchmark. Similarly, applying a common deflator across household groups can alter comparisons of real living standards and inequality (Jaravel 2021), as well as measured poverty rates and the composition of the population classified as poor (Lokshin et al. 2025). This issue is particularly relevant in African settings, where poverty trends are commonly constructed by deflating nominal consumption with the national consumer price index (CPI) (Dabalen et al. 2020). Differences in experienced inflation may also shape household expectations and responses to policy (Dietrich 2024).

Most evidence on household inflation inequality comes from high-income settings (Jaravel 2021; Chien et al. 2026), leaving relatively little evidence on group exposure profiles in high-poverty economies. Our study examines inflation inequality across two markedly different inflation environments in Malawi: a period of relatively moderate inflation from April 2016 to April 2019, and a more volatile, high-inflation period from April 2019 to July 2024 that encompassed the COVID-19 disruption and the sharp acceleration in food prices after 2022. Across these periods, category-level price growth differed not only in its overall pace but also in its dispersion across consumption categories. This contrast allows us to examine whether the household groups facing higher inflation exposure, and the consumption categories driving those differences, change across inflation environments.

We focus on inflation exposure across six household dimensions: expenditure rank, place of residence, educational attainment of the household head, sex of the household head, age of the household head, and household size. Combining three waves of Malawi's Integrated Household Survey (IHS) with category-level consumer price indices, we construct group-specific consumption baskets that reflect differences in expenditure patterns across households, following the approach used in the household inflation literature (Hobijn and Lagakos 2005; Chien et al. 2026).

Furthermore, by combining group-specific consumption baskets with a common set of national category-price changes, we examine not only the magnitude of each inflation-exposure gap but also its composition. We decompose each gap into contributions from twelve consumption categories, including food, housing, water and energy, and transport. This detailed accounting allows us to identify the categories underlying each socioeconomic contrast and to compare their contributions across Malawi's moderate- and high-inflation environments.

Characterizing these differences fully, however, requires specifying how household consumption baskets are aggregated. A democratic index first computes each household's budget shares and then averages those shares using survey weights, giving each represented household equal influence conditional on the survey design. A plutocratic group-expenditure index instead aggregates expenditure across households before forming budget shares, thereby giving higher-expenditure households greater weight. These operators represent different reporting objects: the democratic index describes exposure for the average survey-represented household, whereas the plutocratic index describes exposure associated with the group's aggregate expenditure (Prais 1959; Nicholson 1975).

This distinction may also inform comparisons with survey-based indicators of inflation perceptions and expectations, which do not ordinarily weight respondents by their expenditure levels (Martin 2025). Arioli et al. (2017) identify the plutocratic rather than democratic consumption weights used in the official Harmonised Index of Consumer Prices (HICP) as one possible reason consumer estimates differ from measured inflation. Neither operator has an independent welfare-economic basis (Pollak 1980; Crossley and Pendakur 2010), so the choice between them turns on the purpose of the index (Nicholson 1975; Martin 2025). That choice binds hardest where expenditure inequality is high and price changes are widely dispersed across items (Ley 2005), conditions that hold in Malawi in both periods. We therefore report both operators to assess whether the magnitude, direction, and category composition of between-group exposure gaps depend on whose consumption the group index represents.

Because our question concerns households rather than aggregate expenditure, we treat the democratic estimates as primary. They reveal four socioeconomic gaps in inflation exposure that have the same direction in both periods. Exposure is higher for households in the bottom expenditure quintile, rural households, households whose heads have below-primary educational attainment, and female-headed households, with all period-specific marginal intervals excluding zero. The relative magnitudes of these gaps differ across inflation environments. The bottom–top expenditure gap is the largest of the four in 2016–2019, whereas the education and rural–urban gaps exceed it in 2019–2024. Under the democratic measure, food makes the largest positive contribution to the expenditure, residence, and education gaps, while housing, water and energy makes the largest positive contribution to the female-headship gap.

These democratic results partly echo early U.S. evidence and more recent evidence from Europe and Central Asia. Michael (1979) and Hagemann (1982) find higher inflation among low-income and less-educated U.S. households in particular periods, while Lokshin et al. (2025) find that the lowest consumption decile is the most exposed in nearly every country and that rural households are more exposed than urban households in most of their samples. Our findings extend this evidence in two respects. First, all four socioeconomic gaps retain the same direction across two separately estimated inflation periods, whereas the early U.S. studies emphasize temporal instability in subgroup differences. Second, the female-headship gap is positive in both periods, whereas Lokshin et al. (2025) find no systematic cross-country pattern by the sex or age of the household head. Beyond documenting these patterns, our group-specific basket approach allows us to trace each gap to its category-level sources.

Our results complement efforts to improve national CPI accuracy by showing how group-specific baskets determine the index's representativeness across households. This distinction matters because households near the poverty line may hold consumption baskets that differ systematically from the basket represented by a plutocratically weighted national index.

Turning from the household-oriented democratic measure to the aggregate-expenditure benchmark, the four socioeconomic patterns persist under plutocratic aggregation, although the resulting gaps are larger than under the democratic measure in both periods. The demographic contrasts are more sensitive to the aggregation operator. The age comparison reverses direction between operators in both periods, whereas the household-size comparison reverses direction only in 2016–2019 and differs little across operators in 2019–2024. Thus, the choice of aggregation operator affects the magnitude of the persistent socioeconomic gaps and can alter the substantive conclusion for some demographic comparisons.

The direction of our plutocratic expenditure gradient is consistent with earlier U.S. evidence, although its magnitude is substantially larger in Malawi. Hobijn and Lagakos (2005) find only a small average poor–nonpoor gap, but a larger difference during periods of rising gasoline prices. Similarly, McGranahan and Paulson (2006), Jaravel (2019), and Chien et al. (2026) report annual bottom–top income-group gaps well below one percentage point. Using expenditure rather than income quintiles, Mori and Sánchez (2025) likewise document greater accumulated inflation among lower-expenditure households, with larger differences in selected years. Our corresponding plutocratic gaps are 1.263 and 1.742 percentage points per year. The category decomposition also reveals a qualitative pattern similar to that reported by Chien et al. (2026), with food contributing positively and transport negatively to the bottom–top gap in both settings. The leading positive contributor nevertheless differs across settings. Food dominates in Malawi, whereas housing dominates in their U.S. estimates.

This widening arises because higher-spending households within each group hold consumption baskets exposed to slower price growth. This within-group difference is smallest among low-expenditure, rural, below-primary-education, and female-headed households. Comparing the two operators group by group therefore separates whose consumption a group index represents from the between-group comparison itself. Existing measurement of the plutocratic–democratic difference is almost entirely at the level of the national index, where its sign varies across settings (Izquierdo et al. 2003; Martin 2025). Lokshin et al. (2025) define both group operators and note that the distinction may account for part of their results, but leave it unseparated. Our group-by-group comparison makes that component explicit for each contrast and shows it to be large enough to reverse the direction of the age comparison.

The remainder of the paper is organized as follows. Section 2 describes the data and explains the construction of the group-specific cost-of-living indices. Section 3 reports the between- and within-group results and their category-level sources. Section 4 compares the two national inflation measures with the published CPI and examines sensitivity to the index formula. Section 5 concludes.

2 Data and Empirical Method

The analysis combines Malawi's Integrated Household Survey (IHS), conducted by the National Statistical Office (NSO), with the consumer price index published by the International Monetary Fund (IMF). The survey records household spending in twelve broad consumption categories, while the price series reports how the prices of those same categories change. Because both sources use categories from the Classification of Individual Consumption According to Purpose (COICOP), survey spending and price changes line up one for one. The survey therefore supplies each household's budget shares, and the price series supplies one national price change per category, which is assigned to every household.[1] Table 6 in Appendix A lists the twelve categories together with the survey expenditure variables mapped to each.

2.1 Survey data

We use the fourth wave, IHS4, fielded in 2016–2017, the fifth wave, IHS5, fielded in 2019–2020, and the sixth and most recent wave, IHS6, fielded in 2024–2025 (National Statistical Office of Malawi 2017, 2020, 2025). The three earlier waves—IHS1 (1997–1998), IHS2 (2004–2005) and IHS3 (2010–2011)—are not used, because the price side of the analysis cannot reach them. The IMF reports the twelve category indices for Malawi only from 2014 onward, and among the sources we could locate it is the one that carries all twelve categories furthest back.[2]

The three waves are independent cross-sections, containing 12,447, 11,434, and 12,888 households in IHS4, IHS5, and IHS6, respectively. From IHS6 we exclude the 386 households enumerated in the Dzaleka refugee camp because they belong to a supplemental sample added in IHS6 that has no counterpart in IHS4 or IHS5. We also exclude households whose real annual expenditure per capita exceeds fifty times their own wave's survey-weighted median: three in IHS4, two in IHS5, and none in IHS6. The analysis samples are therefore 12,444, 11,432, and 12,502 households.

To construct each household's consumption basket, we use the official annual expenditures for the twelve consumption categories provided in each IHS wave. These expenditures have already been adjusted for price differences across locations and interview months, so the expenditures of all households within a wave are expressed at a common national price level. The reference month is April 2016 for IHS4, April 2019 for IHS5, and July 2024 for IHS6. We then divide expenditure in each category by the household's total expenditure to obtain its budget shares.

We group the households along the characteristics of the head and of the household as a whole. The head characteristics are sex, age and education. Education is grouped by the highest formal qualification acquired by the household head. We describe heads with no formal educational qualification as having below-primary educational attainment. This group includes both heads who never attended school and those who

[1] The sixth wave (IHS6) introduces an additional "other" category. It accounts for 0.05% of expenditure. To make the analysis comparable across the three survey waves, we exclude this category.

[2] The International Labour Organization (ILO) publishes the same COICOP divisions for Malawi, but they likewise begin in 2014. A discontinued ILO series beginning in 1976 and a Food and Agriculture Organization series beginning in 2000 separate only food from all items and therefore cannot support a twelve-category decomposition.

attended but did not obtain a qualification.[3] The second group holds a primary-level qualification, including the Primary School Leaving Certificate and the Junior Certificate of Education. We classify the latter in this group because it is awarded only two years into secondary school and therefore does not represent a completed secondary qualification. The third group holds a secondary qualification or higher, including the Malawi School Certificate of Education, the General Certificate of Secondary Education, an Advanced Level qualification, a diploma, a bachelor's degree, a master's degree, or a doctorate. We also group households by household size and by urban or rural residence, using the IHS classifications.

Table 1 summarizes household characteristics by expenditure quintile. Quintiles are defined separately within each IHS wave using survey weights, and all characteristics are first estimated by wave and then averaged across the three waves with equal weight. The first three rows report mean per capita expenditure relative to the third quintile in each wave, with annual dollar equivalents shown in parentheses. These dollar amounts help readers unfamiliar with kwacha values gauge the scale of living standards within each wave. Relative expenditure profiles are similar across waves: mean expenditure in the lowest quintile is approximately 45 percent of that in the third quintile, whereas mean expenditure in the highest quintile is more than three times as high.

Several household characteristics are systematically associated with expenditure. The share of household heads with secondary or higher education rises from 2.12 percent in the lowest quintile to 34.69 percent in the highest, while average household size falls from 5.35 to 3.19. Rural residence declines from 96.00 to 57.02 percent. Female-headed households are also more common toward the bottom of the distribution, whereas the age of the household head varies relatively little across quintiles. These patterns show that expenditure is closely associated with education, household size, residence, and the sex of the household head, so the corresponding household groups overlap substantially.

2.2 Price data

The price input is the national IMF monthly consumer price index for the twelve COICOP categories. For category k and a comparison running from month t_0 to month t_1, the annual log price change is

$$\ell_k^{t_0,t_1} = \frac{12}{t_1 - t_0} \log\left(\frac{CPI_{k,t_1}}{CPI_{k,t_0}}\right), \tag{1}$$

where t_0 and t_1 are the two waves' valuation months and $t_1 - t_0$ is the number of months between them. The price series is monthly, so the factor of 12 states the change per year rather than per month. The span from IHS4 to IHS5 is 36 months, or 3 years (April 2016 to April 2019), and the span from IHS5 to IHS6 is 63 months, or 5.25 years (April 2019 to July 2024). We set t_0 and t_1 to these months because the real expenditure values in each IHS wave are deflated to the corresponding valuation month.

[3] Three heads across the three waves have no recorded qualification and do not report that they never attended school. We therefore exclude them from analyses involving education.

Table 1 Household Profiles by Expenditure Quintile

Item	All households	Lowest	Second	Third	Fourth	Highest
Expenditure per capita relative to the third quintile (annual US dollars in parentheses)						
IHS4	1.34	0.47	0.73	1.00	1.40	3.09
	(292)	(103)	(159)	(218)	(304)	(673)
IHS5	1.39	0.45	0.72	1.00	1.44	3.32
	(351)	(114)	(182)	(253)	(364)	(841)
IHS6	1.41	0.44	0.72	1.00	1.43	3.47
	(537)	(167)	(272)	(380)	(545)	(1,320)
Average household size	4.30	5.35	4.76	4.31	3.89	3.19
Average head age	42.77	43.18	42.87	43.53	42.83	41.44
Rural	82.52	96.00	91.99	88.32	79.29	57.02
Female-headed	29.83	35.34	31.58	30.14	27.44	24.63
Head age						
30 or younger	25.61	21.56	23.77	25.42	27.77	29.54
31–40	26.91	29.43	27.80	24.84	25.44	27.04
41–50	19.50	21.51	21.34	19.73	17.83	17.08
51 or older	27.98	27.50	27.09	30.00	28.96	26.34
Head education						
Below primary	68.05	85.85	77.96	72.25	63.32	40.90
Primary	20.03	12.04	17.73	21.36	24.63	24.39
Secondary or higher	11.92	2.12	4.31	6.40	12.06	34.69
Household size						
1–2	17.04	2.71	6.97	13.28	22.17	40.03
3–5	57.97	54.38	62.29	63.64	60.65	48.91
6 or more	24.99	42.91	30.74	23.09	17.18	11.06
N	36,378	7,128	7,251	7,242	7,254	7,503

Notes: Expenditure quintiles and household characteristics are calculated separately within each IHS wave using the household survey weights. The resulting household profiles are then averaged across the three waves, giving each wave equal importance. Education refers to the household head's highest formal qualification. Here, "below primary" denotes no formal educational qualification. N denotes the pooled unweighted number of households across the three waves. Figures in parentheses are mean annual expenditure per capita in US dollars, obtained by converting the kwacha values at each wave's valuation month at the monthly period-average exchange rate reported in the IMF's International Financial Statistics: 688.69 kwacha per dollar in April 2016, 742.41 in April 2019, and 1,749.49 in July 2024.

Figure 1 plots the twelve category indices together with the published all-items index over the period spanning the three survey waves. Food prices rose the fastest, reaching 459 by July 2024, compared with 144 for communication, 166 for education, and 344 for the all-items index. Health, recreation, alcohol and tobacco, and housing, water and energy also initially outpaced the all-items index but later fell behind as food inflation accelerated sharply after 2022.

Prices rose both faster and more unevenly in the second survey pair than in the first. Between April 2016 and April 2019, the annualized log price change $\ell_k^{t_0,t_1}$ runs from 3.63 points a year for communication to 13.52 for health, with a cross-category standard deviation of 2.96 points. Between April 2019 and July 2024 the range widens to 4.91 for communication and 22.13 for food, and the standard deviation rises to 4.72 points. Because budget shares interact with this dispersion to generate differences in household exposure, a single index running from April 2016 to July 2024 would average two regimes that differ in both level and spread. We therefore analyze the two periods separately.

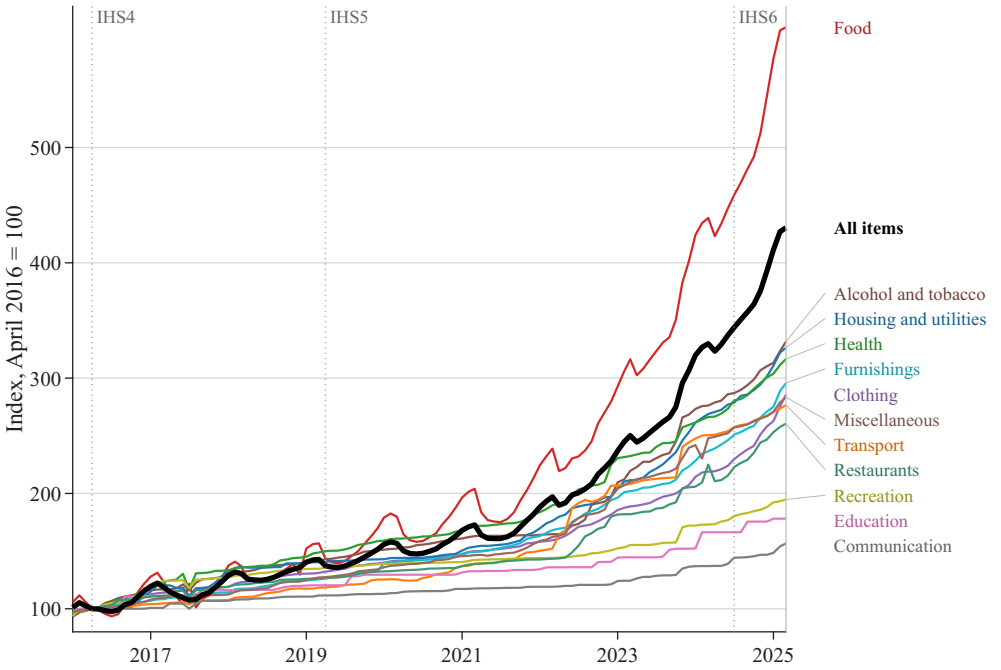


Fig. 1 Category Price Indices Across the Three Waves

Notes: Monthly IMF consumer price indices for Malawi, the twelve COICOP divisions of Table 6 together with the published all-items index drawn in bold. Each series is rebased to 100 in April 2016, the month at which IHS4 consumption is valued. Vertical dotted lines mark the valuation month of each wave: April 2016, April 2019 and July 2024.

2.3 Index formula and aggregation operators

We follow Jaravel (2019) and Chien et al. (2026) and use the Törnqvist index to measure the cost of living. The Törnqvist index averages expenditure shares across the two periods rather than fixing the weights at either period. Its weights therefore adjust as households reallocate consumption in response to relative price changes, reducing substitution bias relative to fixed-weight indices. Moreover, Diewert (1976) provides a formal economic-theoretic foundation for this index, showing that the Törnqvist index is exact for a linearly homogeneous translog unit cost function. Because the translog is a flexible functional form, the Törnqvist index is therefore a superlative index, providing a second-order approximation to a broad class of underlying cost-of-living functions.

Given this choice of index formula, group g's annual log price exposure is

$$T^{E}_{g,t_0,t_1} = \sum_{k=1}^{12} \underbrace{\tfrac{1}{2}\left(s^{E}_{gk,t_0} + s^{E}_{gk,t_1}\right)}_{\text{two-wave average share}} \ell_k^{t_0,t_1}, \tag{2}$$

where $\ell_k^{t_0,t_1}$, defined in Equation (1), is the annualized log price change for category k between waves t_0 and t_1. The superscript E indexes the aggregation operator used to

construct the group-level expenditure share $s^E_{gk\tau}$ in wave $\tau \in \{t_0, t_1\}$ from household-level shares.

Here we follow Prais (1959) and define two aggregation operators, a "plutocratic" share $s^{\mathrm{P}}_{gk\tau}$ and a "democratic" share $s^{\mathrm{D}}_{gk\tau}$, for turning household-level budget shares into the group-level share $s^E_{gk\tau}$ that enters equation (2). As Pollak (1980, p. 276) interprets them, under the plutocratic operator every dollar of expenditure counts equally, whereas under the democratic operator every household counts equally.

These two interpretations follow directly from how the group-level shares are constructed. For household i in wave τ, let $x_{ik\tau}$ denote expenditure on category k. $X_{i\tau} = \sum_k x_{ik\tau}$ is the total expenditure across the twelve categories, and $b_{ik\tau} = x_{ik\tau}/X_{i\tau}$ is the household's budget share for category k. The plutocratic share aggregates expenditure before forming shares,

$$\begin{aligned} s^{\mathrm{P}}_{gk\tau} &= \frac{\sum_{i\in g} q_{i\tau} x_{ik\tau}}{\sum_{i\in g} q_{i\tau} X_{i\tau}} \\ &= \sum_{i\in g} \left(\frac{q_{i\tau} X_{i\tau}}{\sum_{j\in g} q_{j\tau} X_{j\tau}} \right) b_{ik\tau}. \end{aligned} \tag{3}$$

where $q_{i\tau}$ is the household survey weight. The second expression shows that the plutocratic share is a weighted average of household budget shares. Household i's effective weight is proportional to its survey weight multiplied by its total expenditure, $q_{i\tau} X_{i\tau}$. Conditional on the survey weight, a household's influence therefore rises in proportion to its total expenditure. For example, among two households with the same survey weight, a household that spends five times as much receives five times the relative weight. The resulting share represents the consumption basket associated with the group's aggregate expenditure. This is the weighting operator implicit in a conventional CPI, and we use it as the benchmark for comparison with Malawi's published index.

The democratic share instead averages household-level shares directly,

$$\begin{aligned} s^{\mathrm{D}}_{gk\tau} &= \frac{\sum_{i\in g} q_{i\tau} b_{ik\tau}}{\sum_{i\in g} q_{i\tau}} \\ &= \sum_{i\in g} \left(\frac{q_{i\tau}}{\sum_{j\in g} q_{j\tau}} \right) b_{ik\tau}. \end{aligned} \tag{4}$$

The second expression shows that the democratic share is also a weighted average of household budget shares, but household i's normalized weight is $q_{i\tau} / \sum_{j\in g} q_{j\tau}$. Unlike under the plutocratic operator, total expenditure $X_{i\tau}$ does not enter this weight. Thus, after accounting for the survey design, a household's influence does not vary with its total expenditure. We use the term "democratic" throughout to denote this equal-household operator.

Table 2 reports the whole-population two-wave average shares $\bar{s}^E_k$ and category price changes under each operator.

Table 2 Whole-Population Budget Shares Under the Two Operators

	IHS4–IHS5 April 2016–April 2019				IHS5–IHS6 April 2019–July 2024			
Category	$\bar{s}_k^{\mathrm{D}}$	$\bar{s}_k^{\mathrm{P}}$	$\bar{s}_k^{\mathrm{P}} - \bar{s}_k^{\mathrm{D}}$	ℓ_k	$\bar{s}_k^{\mathrm{D}}$	$\bar{s}_k^{\mathrm{P}}$	$\bar{s}_k^{\mathrm{P}} - \bar{s}_k^{\mathrm{D}}$	ℓ_k
Food and non-alcoholic beverages	59.60	56.48	-3.12	12.07	61.47	57.78	-3.68	22.13
Housing, water and energy	20.91	18.18	-2.73	11.34	19.36	17.31	-2.05	13.05
Miscellaneous goods and services	2.83	2.74	-0.09	8.07	2.93	2.89	-0.04	13.38
Restaurants and hotels	1.02	1.04	+0.02	7.83	0.64	0.73	+0.09	10.79
Health	1.71	1.77	+0.06	13.52	1.59	1.60	+0.01	11.94
Alcoholic beverages and tobacco	0.66	0.76	+0.10	11.90	0.74	0.86	+0.13	13.28
Clothing and footwear	2.06	2.39	+0.33	9.31	2.08	2.34	+0.27	10.53
Recreation and culture	0.30	0.65	+0.36	10.13	0.26	0.59	+0.33	5.44
Furnishings and equipment	3.48	3.94	+0.46	7.82	2.94	3.41	+0.48	13.06
Communication	2.07	2.81	+0.74	3.63	2.28	2.76	+0.48	4.91
Education	1.81	2.97	+1.17	6.18	2.06	3.22	+1.16	6.17
Transport	3.57	6.27	+2.70	5.68	3.66	6.50	+2.84	14.78
Implied annual rate	11.698	11.346			20.049	19.525		

Notes: Two-wave average shares of equation (2) for all households, in percent, ordered by the $\bar{s}_k^{\mathrm{P}} - \bar{s}_k^{\mathrm{D}}$ column of the first comparison. The IHS4–IHS5 columns average IHS4 and IHS5 shares, and the IHS5–IHS6 columns average IHS5 and IHS6 shares. ℓ_k is the annual log price change of equation (1), times 100. The last row applies each share column to the ℓ_k beside it through equation (2) and converts the resulting log exposure T^E to a rate as in equation (5). Each entry is rounded independently. Both comparisons use the trimmed analysis samples of Section 2.

In the 2016–2019 comparison, food and housing receive more weight under the democratic operator ($\bar{s}_k^{\mathrm{P}} - \bar{s}_k^{\mathrm{D}}$ of -3.12 and -2.73 points), whereas transport, education and communication receive more weight under the plutocratic operator ($\bar{s}_k^{\mathrm{P}} - \bar{s}_k^{\mathrm{D}}$ of +2.70, +1.17 and +0.74 points).

The category price changes $\ell_k^{t_0,t_1}$ are national and common to both operators because only category-level price indices are available. Heterogeneity in T_{g,t_0,t_1}^E therefore reflects differences in expenditure shares, not differences in the prices households face within a category. For example, the measure does not capture variation in food-price inflation arising when households purchase different mixes of products within the food category.

3 Inflation Exposure Gaps Across Household Types

Household exposure to a common set of national category-price changes can differ because groups allocate their budgets differently. We examine twelve household groups, organized into six paired contrasts: bottom versus top expenditure quintile, rural versus urban residence, below-primary versus secondary-or-higher educational attainment of the household head, female versus male household headship, younger versus older household heads, and large versus small households. We first compare between-group exposure gaps under the democratic and plutocratic operators and identify their category-level sources. We then examine whom each group index represents by studying within-group differences between the two aggregation operators.

3.1 Between-Group Inflation Exposure Gaps and Their Consumption-Basket Sources

Inflation inequality is often summarized by differences between price indices constructed for household groups with different consumption baskets (Michael 1979; Hagemann 1982; Hobijn and Lagakos 2005; Jaravel 2021; Chien et al. 2026). Because our indices apply the same national category-price changes to group-specific expenditure shares, we refer to these differences as *inflation exposure gaps*, rather than differences in realized household inflation.

Specifically, let R_g^E denote group g's annualized inflation exposure under aggregation operator $E \in \{\mathrm{D}, \mathrm{P}\}$:

$$R_g^E = 100\big(e^{T_{g,t_0,t_1}^E} - 1\big). \tag{5}$$

For groups A and B, define the between-group inflation exposure gap as

$$G_{AB}^E \equiv R_A^E - R_B^E, \qquad E \in \{\mathrm{D}, \mathrm{P}\}. \tag{6}$$

A positive value means that group A has higher measured exposure than group B, while a negative value means that group B has higher exposure. We refer to G_{AB}^{D} and G_{AB}^{P} as the democratic and plutocratic estimates of the between-group exposure gap, respectively.

Table 3 reports G_{AB}^{D} and G_{AB}^{P} for six household contrasts over the two consecutive survey pairs. We treat the democratic estimate as the primary measure of exposure for the average survey-represented household and report the plutocratic estimate as the aggregate-expenditure benchmark. The final column reports $G_{AB}^{\mathrm{P}} - G_{AB}^{\mathrm{D}}$, the paired difference between the operator-specific gaps. This difference measures whether and by how much the reported gap changes with the aggregation operator.

Under democratic aggregation, four contrasts show the same direction in both periods. Inflation exposure is higher for the bottom than the top expenditure quintile, for rural than urban households, for households whose heads have below-primary rather than secondary-or-higher educational attainment, and for female-headed than male-headed households. All eight corresponding bootstrap intervals exclude zero. In 2016–2019, the point estimates are 0.881 percentage points per year for the bottom–top gap and 0.858 points for the education gap. In 2019–2024, the education, rural–urban, and bottom–top point estimates are 1.531, 1.367, and 0.980 points, respectively. The female-headship gap remains positive but smaller, at 0.214 and 0.174 points in the two periods. Taken together, the point estimates show that the magnitudes and relative rankings of the four gaps differ between the two periods.

The plutocratic estimates preserve the direction of all four gaps. Across the two operators and two periods, all sixteen marginal intervals for these contrasts exclude zero. The central finding—higher exposure among low-expenditure, rural, below-primary-education, and female-headed households—is therefore not specific to democratic aggregation. We return to operator-dependent magnitudes and paired inference in Subsection 3.2.

The annualized gaps accumulate over the full observation window. Normalizing each group's democratic exposure index to 100 in April 2016 and chaining the two

Table 3 Inflation Exposure Gaps Under the Two Aggregation Operators, by Consecutive Survey Pair

Contrast (A minus B)	Democratic D	Plutocratic P	P − D (paired)
Panel A: IHS4–IHS5 (April 2016–April 2019)			
Bottom 20% – top 20%	0.881 [0.825, 0.934]	1.263 [1.147, 1.374]	0.382 [0.309, 0.454]
Rural – urban	0.557 [0.500, 0.618]	0.816 [0.685, 0.952]	0.259 [0.168, 0.349]
Below primary – secondary or higher	0.858 [0.795, 0.924]	1.185 [1.039, 1.325]	0.326 [0.233, 0.417]
Female-headed – male-headed	0.214 [0.190, 0.239]	0.283 [0.219, 0.348]	0.069 [0.020, 0.121]
Head age ≤ 30 – head age ≥ 51	−0.108 [−0.140, −0.076]	0.085 [0.009, 0.162]	0.193 [0.136, 0.249]
Household size 6 or more – size 1–2	−0.084 [−0.124, −0.043]	0.052 [−0.049, 0.159]	0.136 [0.055, 0.221]
Panel B: IHS5–IHS6 (April 2019–July 2024)			
Bottom 20% – top 20%	0.980 [0.855, 1.101]	1.742 [1.534, 1.921]	0.762 [0.644, 0.867]
Rural – urban	1.367 [1.248, 1.491]	1.927 [1.722, 2.131]	0.559 [0.425, 0.686]
Below primary – secondary or higher	1.531 [1.414, 1.636]	2.200 [1.998, 2.390]	0.669 [0.538, 0.798]
Female-headed – male-headed	0.174 [0.117, 0.231]	0.310 [0.197, 0.424]	0.135 [0.058, 0.216]
Head age ≤ 30 – head age ≥ 51	−0.037 [−0.115, 0.042]	0.294 [0.121, 0.471]	0.332 [0.198, 0.463]
Household size 6 or more – size 1–2	−0.150 [−0.241, −0.060]	−0.163 [−0.318, 0.008]	−0.013 [−0.127, 0.109]

Notes: Values are annualized differences in percentage points under the Törnqvist formula over 3 years in Panel A and 5.25 in Panel B. The two panels are separate runs of the same estimation code, specification and seed, and differ only in the survey pair and CPI endpoints. The D and P columns report G^{D}_{AB} and G^{P}_{AB}. Their brackets give marginal 95% intervals. The P − D column reports $G^{\mathrm{P}}_{AB} - G^{\mathrm{D}}_{AB}$. Its brackets give paired 95% intervals constructed from the difference within each bootstrap replicate. All intervals use 5,000 district-stratified enumeration-area replicates. Survey waves are resampled separately, and the CPI series is held fixed. Points and intervals are computed before rounding.

survey-pair comparisons, the cumulative July 2024 differential is 9.5 percent for education, 7.8 percent for rural versus urban residence, and 6.9 percent for the bottom versus top expenditure quintile.[4]

Both operators place Malawi's expenditure gradient well above the magnitudes reported for high-income settings. The democratic bottom–top gaps are 0.881 and 0.980 percentage points per year and their plutocratic counterparts are 1.263 and 1.742 points, whereas Hobijn and Lagakos (2005) find only a small average poor–nonpoor gap outside episodes of rising energy prices, and Chien et al. (2026), McGranahan and Paulson (2006) and Jaravel (2019) report annual bottom–top income-group gaps

[4]These are cumulative differentials in chained exposure indices rather than estimates from a single 2016–2024 index. Because IHS4, IHS5, and IHS6 are independent cross-sections, each index describes a group as constituted in each wave rather than a fixed set of households followed over time.

of about 0.14, 0.20 and 0.35 points. Mori and Sánchez (2025), who rank households by expenditure rather than income as we do, likewise document greater accumulated inflation among lower-expenditure households, with larger differences in selected years. These are descriptive rather than harmonized benchmarks: Malawi ranks households by per-capita expenditure, whereas the cited U.S. studies generally rank by income and differ in period, price detail, and aggregation.

The direction of the four socioeconomic gaps is likewise consistent with existing cross-country and historical evidence. Our estimates show that the same directional pattern recurs across two contrasting inflation periods. Across 44 countries during the 2022 cost-of-living episode, Lokshin et al. (2025) find the lowest consumption decile to be the most exposed group in nearly every country and rural households to be more exposed than urban households in most samples, and Michael (1979) and Hagemann (1982) report higher inflation among low-income and less-educated U.S. households in particular periods. Our results extend this evidence in two respects. First, all four gaps retain the same direction across two separately estimated periods that differ sharply in the pace and dispersion of category price growth, whereas the early U.S. studies emphasize the instability of subgroup differences across periods. Second, the female-headship gap is positive in both periods and under both operators, whereas Lokshin et al. (2025) find no systematic cross-country pattern by the sex of the household head.[5]

The age contrast is different because its interpretation changes with the aggregation operator. Under democratic aggregation, the young-minus-old estimate is −0.108 points in 2016–2019 and −0.037 points in 2019–2024. Only the first interval excludes zero. Under plutocratic aggregation, the estimates become positive, at 0.085 and 0.294 points, and both intervals exclude zero. Aggregation therefore changes which age group appears to face higher exposure, not merely the magnitude of the gap.

Household size displays a related but distinct pattern. Under democratic aggregation, households of six or more have lower measured exposure than households of one or two in both periods, with gaps of −0.084 and −0.150 points and intervals excluding zero. The plutocratic estimate reverses sign in 2016–2019, at 0.052 points, but remains negative and close to the democratic point estimate in 2019–2024, at −0.163 points. Both plutocratic marginal intervals include zero. The paired comparison of the two operators is taken up in Subsection 3.2.

To identify the consumption-basket sources of the between-group exposure gap, equation (6) can be decomposed as

$$
\begin{aligned}
G^E_{AB} &= R^E_A - R^E_B = \sum_{k=1}^{12} c^E_{AB,k}, \\
c^E_{AB,k} &= 100\,\Phi^E_{AB}\big(\bar{s}^E_{Ak} - \bar{s}^E_{Bk}\big)\ell_k^{t_0,t_1}, \\
\Phi^E_{AB} &= \frac{e^{T^E_A} - e^{T^E_B}}{T^E_A - T^E_B}.
\end{aligned}
\tag{7}
$$

[5]The comparison is qualitative because the studies differ in how they rank economic position, whether they condition on other household characteristics, the populations they cover, and the periods they study.

Here, Φ^E_{AB} is the logarithmic mean of the two gross exposure factors $e^{T^E_A}$ and $e^{T^E_B}$ (Carlson 1972). It converts the additive log-exposure components into annualized percentage-point contributions.

Figure 2 applies equation (7) separately under the two aggregation operators. For each $E \in \{\mathrm{D}, \mathrm{P}\}$, the twelve category contributions sum to the corresponding between-group estimate in Table 3. The figure displays food, housing and utilities, and transport separately, combines the remaining nine categories as "Other categories," and marks the twelve-category total with a black diamond.

The expenditure, residence, and education contrasts share a food-led pattern. Food is the largest positive contribution under both operators and in both periods, while transport offsets part of each gap. Female headship follows a different basket-composition channel: under democratic aggregation, the housing, water and energy category is the largest positive contribution in both periods and changes little in magnitude. Under plutocratic aggregation, housing leads food in 2016–2019, but food leads housing in 2019–2024. Plutocratic aggregation generally magnifies both the positive food contribution and the negative transport offset, explaining why it produces larger total gaps without changing their direction.

The food-led pattern and the offset from transport qualitatively parallel recent U.S. evidence for lower-income households (Chien et al. 2026). More broadly, earlier U.S. studies also trace the exposure of economically vulnerable groups to differences in spending on food and energy (Hobijn and Lagakos 2005; McGranahan and Paulson 2006). The female-headship gap in Malawi follows a different accounting pattern, with housing, water and energy providing the leading positive contribution. Thus, the comparison points to a recurring role for food in expenditure-related gaps, but not to a common category mechanism across all household characteristics.

The age and household-size contrasts involve greater cancellation across categories. For age, the food contribution changes sign between the two operators in both periods, helping explain the reversal in the total gap. For household size, a larger negative housing contribution under democratic aggregation is partly offset by food and the remaining categories. At the point estimates, these category contributions describe the basket-composition channels underlying the total gaps.

The operator sensitivity of the age contrast adds a measurement dimension to the period dependence documented in earlier work. Earlier U.S. studies found an elderly inflation premium (Hobijn and Lagakos 2005; McGranahan and Paulson 2006), whereas Chien et al. (2026) find that this premium is nearly absent in recent data and Lokshin et al. (2025) report no systematic cross-country pattern by the age of the household head. The Malawi estimates show that even the direction of an age comparison can depend on whose expenditures the group index represents. Household size provides a related warning against treating demographic inflation gradients as invariant features of the population.

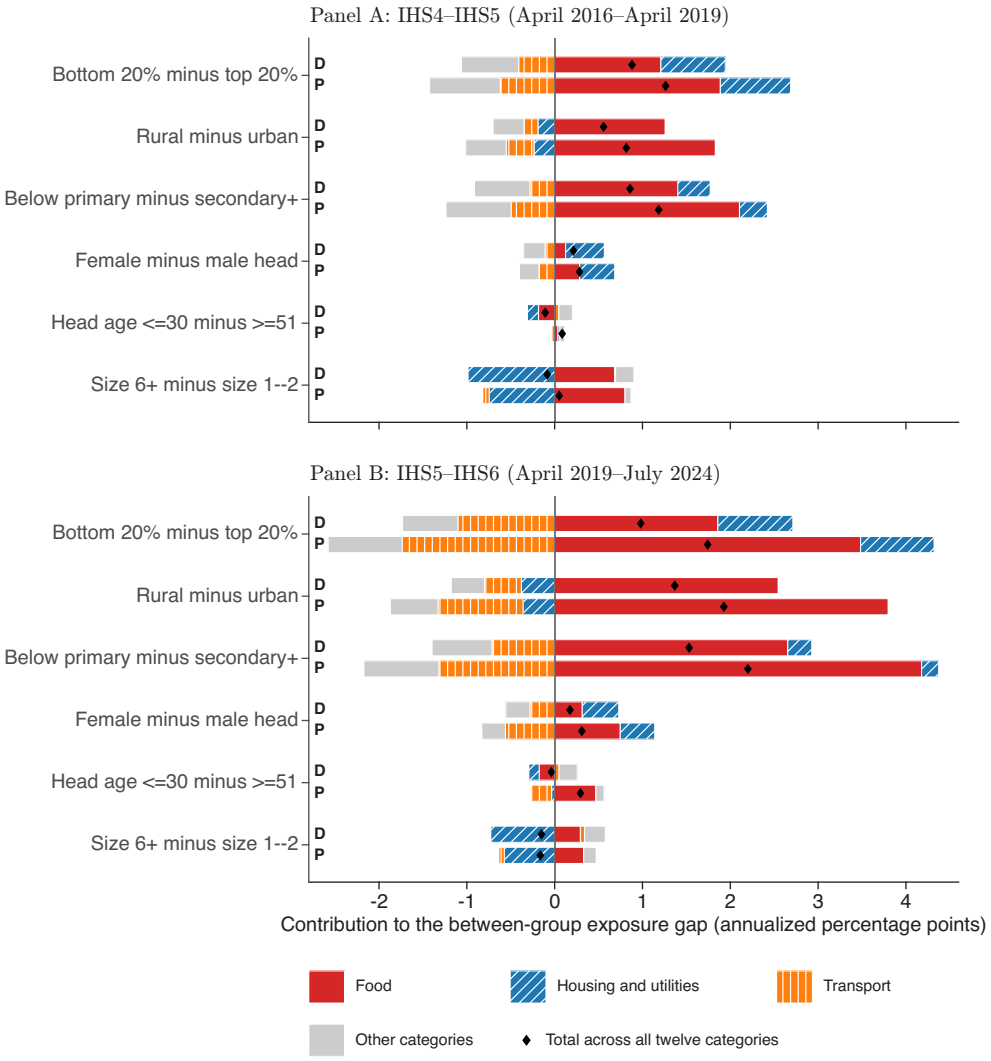


Fig. 2 Category Contributions to Between-Group Exposure Gaps, by Aggregation Operator
Notes: Contributions are annualized percentage points. For each contrast and period, the paired bars report the democratic (D) and plutocratic (P) decompositions. The twelve contributions in each bar sum to the corresponding exposure gap in Table 3, marked by the black diamond. Positive contributions raise the gap for group A minus group B, while negative contributions offset it. "Other categories" combines the nine COICOP divisions other than food, housing and utilities, and transport.

3.2 Whom a Group Index Represents

3.2.1 Within-Group Plutocratic Gaps

The two aggregation operators represent different averages within the same household group. To quantify that difference, following Ley (2005), we define group g's *plutocratic*

gap as

$$\Delta_g = R_g^{\mathrm{P}} - R_g^{\mathrm{D}}. \tag{8}$$

A negative Δ_g means that the plutocratic index reports lower inflation exposure than the democratic index for the same group.

Table 4 reports this difference for the twelve groups analyzed in this paper, with the whole-population estimate included as a benchmark. Brackets give paired 95 percent bootstrap intervals constructed by applying the same resampled enumeration areas to both operators. The CPI series is held fixed, so the intervals capture survey sampling variation only.

Table 4 Within-Group Plutocratic Gaps, $R_g^{\mathrm{P}} - R_g^{\mathrm{D}}$

Group	IHS4–IHS5 April 2016–April 2019	IHS5–IHS6 April 2019–July 2024
All households	−0.352 [−0.401, −0.308]	−0.524 [−0.601, −0.451]
Bottom 20%	−0.029 [−0.036, −0.023]	0.012 [−0.013, 0.030]
Top 20%	−0.411 [−0.484, −0.338]	−0.750 [−0.856, −0.638]
Rural	−0.195 [−0.212, −0.178]	−0.183 [−0.221, −0.147]
Urban	−0.454 [−0.542, −0.363]	−0.742 [−0.860, −0.613]
Below primary	−0.147 [−0.159, −0.135]	−0.115 [−0.143, −0.087]
Secondary or higher	−0.473 [−0.561, −0.379]	−0.784 [−0.907, −0.654]
Female-headed	−0.286 [−0.336, −0.238]	−0.411 [−0.499, −0.326]
Male-headed	−0.355 [−0.408, −0.307]	−0.546 [−0.627, −0.467]
Head age ≤ 30	−0.206 [−0.242, −0.177]	−0.268 [−0.332, −0.207]
Head age ≥ 51	−0.399 [−0.458, −0.341]	−0.600 [−0.740, −0.460]
Household size 6 or more	−0.336 [−0.418, −0.270]	−0.528 [−0.636, −0.419]
Household size 1–2	−0.472 [−0.566, −0.382]	−0.515 [−0.625, −0.406]

Notes: Annualized percentage points are reported. Groups are paired in the same order as Table 3. Brackets give paired 95% intervals from the same 5,000 district-stratified enumeration-area bootstrap procedure. The same resampled areas are applied to both operators, survey waves are resampled separately, and the CPI series is held fixed. Points and intervals are computed before rounding.

For all households, the plutocratic gap is −0.352 percentage points in 2016–2019 and −0.524 points in 2019–2024. The intervals exclude zero in both periods. With the exception of the bottom quintile in 2019–2024, the plutocratic gap is likewise negative and statistically distinguishable from zero within every reported group.

Higher-spending households therefore tend to have consumption baskets exposed to slower price growth than lower-spending households within the same group.

At the point-estimate level, the size of the plutocratic gap varies across groups. The gaps for the top expenditure quintile, urban households, and households whose heads have secondary-or-higher education are more negative than the whole-population benchmark, while those for the bottom quintile, rural households, and households whose heads have below-primary education are much closer to zero. The within-group gaps are also smaller in absolute value for female-headed than for male-headed households and for younger- than for older-headed households, whereas the two household-size groups have similar gaps in 2019–2024. These comparisons describe the group-specific point estimates. Formal comparisons between paired groups require inference on the difference between their plutocratic gaps, which we report below.

Figure 3 shows why the plutocratic gaps differ across groups by plotting food and housing budget shares against within-group expenditure percentiles. A downward slope means that the plutocratic operator assigns less weight to the category than democratic aggregation does.

Food provides the main source of cross-group variation. Its share falls most clearly within the top-quintile, urban, and secondary-or-higher groups, rises within the bottom quintile, and is flatter or non-monotonic within rural and below-primary groups. The housing, water and energy share falls in every group and wave, yielding a widely negative contribution. By contrast, the food contribution varies and can offset it.

Figure 4 reports the category contributions to each within-group plutocratic gap in Table 4. The black diamond is the total across all twelve categories. The four plotted components partition that total into food, housing and utilities, transport, and the remaining categories. For the bottom quintile, offsetting food and housing components produce a small total gap despite substantial aggregation effects.

The aggregation operator should therefore be stated whenever a group index is reported. The democratic operator represents the average survey-represented household, whereas the plutocratic operator represents aggregate expenditure within the group. A small Δ_g means that the reported totals are close, not that the underlying category shares are unchanged.

3.2.2 Differences in Plutocratic Gaps Across Groups

To determine whether the aggregation rule changes a reported between-group exposure gap, we compare the two groups' plutocratic gaps rather than examine either gap in isolation. For a contrast comparing group A with group B, the operator-induced change in the between-group gap is

$$\begin{aligned} W_{AB} &= G^{\mathrm{P}}_{AB} - G^{\mathrm{D}}_{AB} \\ &= \left(R^{\mathrm{P}}_{A} - R^{\mathrm{P}}_{B}\right) - \left(R^{\mathrm{D}}_{A} - R^{\mathrm{D}}_{B}\right) \\ &= \Delta_A - \Delta_B. \end{aligned} \tag{9}$$

W_{AB} is the difference between two groups' plutocratic gaps and measures the aggregation sensitivity of the reported between-group exposure gap. A positive W_{AB} means that plutocratic aggregation produces a larger between-group gap than democratic

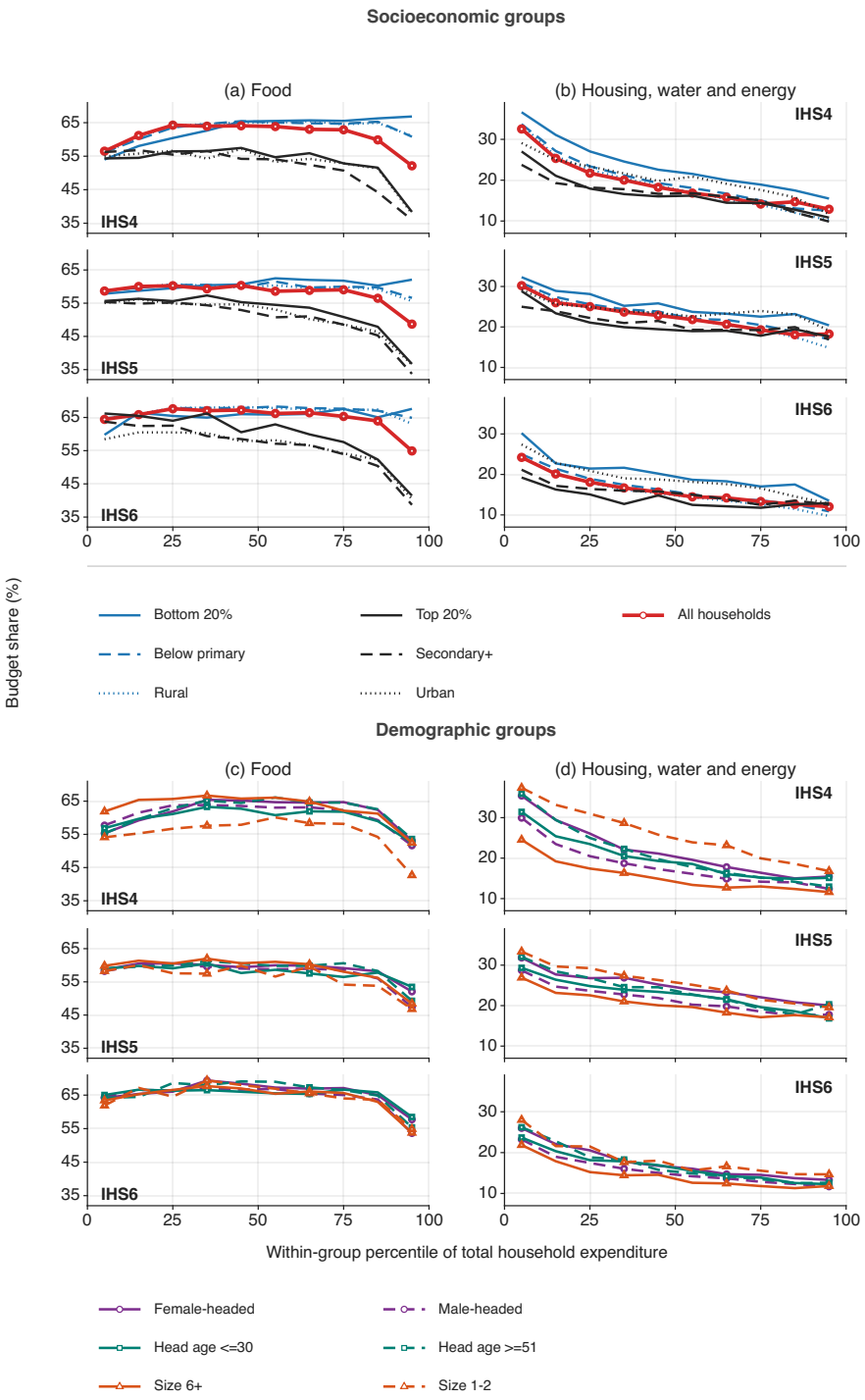


Fig. 3 Food and Housing Budget Shares Within Socioeconomic and Demographic Groups, by Wave

aggregation, whereas a negative value means that it produces a smaller gap. The paired interval for W_{AB} tests whether $\Delta_A = \Delta_B$, which is distinct from testing whether either group's plutocratic gap equals zero.

For the four socioeconomic contrasts whose directions are stable across operators and periods, W_{AB} is positive in all eight period-by-contrast comparisons. Thus, plutocratic aggregation widens the bottom–top, rural–urban, education, and female–male exposure gaps relative to democratic aggregation. More broadly, the paired difference excludes zero for all 6 contrasts in 2016–2019 and for 5 of six in 2019–2024, as reported in the final column of Table 3.

Household size is the second-period exception. In 2016–2019, its between-group estimate changes sign between operators and W_{AB} excludes zero. In 2019–2024, the two operator-specific estimates are similar and W_{AB} is -0.013 percentage points, with an interval of $[-0.127,\ 0.109]$ that includes zero. Age remains aggregation-sensitive in both periods. Accordingly, the within-group finding that plutocratic exposure is generally lower than democratic exposure and the between-group finding that aggregation changes the reported inequality gap are related through equation (9), but they are empirically distinct conclusions.

The plutocratic gap has been studied mainly as a property of a single national index (Prais 1959; Nicholson 1975; Izquierdo et al. 2003; Ley 2005; Martin 2025), while studies of group-specific inflation generally hold the aggregation operator fixed, as in the plutocratic group indices of Hobijn and Lagakos (2005). Lokshin et al. (2025) define both democratic and plutocratic group indices but report their poverty and inequality results using the democratic index. They note that the difference between their household-specific and CPI-based results may partly reflect the plutocratic–democratic distinction, but do not isolate this component. Equation (9) does so for each contrast: the measured between-group gap changes with the operator to the extent that the two groups differ in how expenditure is distributed across their members' consumption baskets. Our democratic estimates therefore provide the direct comparison with their reported group results.

4 National Reporting Benchmark

This section asks how the paper's two national reporting objects compare with Malawi's published CPI and whether their difference depends on the choice of index formula. Table 5 reports both objects under the baseline Törnqvist formula and three alternatives, with the published all-items CPI as an external benchmark.

Under the baseline Törnqvist formula, the plutocratic and democratic annual rates are 11.346 and 11.698 percent in 2016–2019, and 19.525 and 20.049 percent in 2019–2024. The published CPI records 11.127 and 19.133 percent and lies closer to the plutocratic estimate in both periods, consistent with their shared aggregate-expenditure orientation. Differences in underlying weights and item detail make this a comparison of reporting orientation rather than an accuracy ranking.

This distinction matters for how the national deflator is used. In African settings, poverty trends are typically obtained by deflating nominal consumption with the published CPI (Dabalen et al. 2020), so improving the accuracy of that index can change

Table 5 Whole-Population Annual Inflation by Aggregation Operator and Index Formula

IHS weight source	Laspeyres	Paasche	Fisher	Törnqvist
Panel A: IHS4–IHS5 (April 2016–April 2019)				
	(IHS4 basket)	(IHS5 basket)		
Plutocratic (P)	11.429	11.260	11.344	11.346
Democratic (D)	11.783	11.606	11.695	11.698
Plutocratic gap (P − D)	−0.354	−0.346	−0.350	−0.352
Memorandum: published all-items CPI, 11.127 percent a year				
Panel B: IHS5–IHS6 (April 2019–July 2024)				
	(IHS5 basket)	(IHS6 basket)		
Plutocratic (P)	20.066	18.851	19.457	19.525
Democratic (D)	20.474	19.498	19.985	20.049
Plutocratic gap (P − D)	−0.407	−0.647	−0.528	−0.524
Memorandum: published all-items CPI, 19.133 percent a year				

Notes: In each panel, Laspeyres weights price relatives using the earlier wave's basket (IHS4 in Panel A and IHS5 in Panel B), while Paasche uses the later wave's basket (IHS5 in Panel A and IHS6 in Panel B). Fisher is the geometric mean of the Laspeyres and Paasche indices, and Törnqvist averages the two share vectors before applying them to log price relatives as in equation (2). All indices are constructed over the full interval between the two valuation months and then annualized. Each row uses all inflation-eligible households in the analysis samples defined in Section 2: 12,444 households in IHS4, 11,432 in IHS5, and 12,502 in IHS6. The alternative-formula entries provide point-estimate comparisons of the sign and magnitude of the plutocratic gap across formulas.

measured poverty levels and trends. Such improvements do not, however, address the differences documented in Section 3. The between-group gaps of equation (6) arise from differences in the expenditure shares applied to a common set of category price changes $\ell_k^{t_0,t_1}$. Correcting the level of a single national deflator changes every household's real consumption by the same proportion and therefore leaves those differences unchanged. Our work therefore complements efforts to improve the accuracy of the national deflator by providing group-specific cost-of-living indices and examining whether a common national index represents different households equally well.

Applying equation (8) to the whole population gives Törnqvist plutocratic gaps of -0.352 percentage points in 2016–2019 and -0.524 points in 2019–2024, with paired 95 percent bootstrap intervals of $[-0.401,\ -0.308]$ and $[-0.601,\ -0.451]$, respectively. These are the all-households benchmark estimates reported in Table 4, and both intervals exclude zero. Their negative signs mean that higher-spending households within the population have baskets exposed to slower price growth, consistent with the within-group evidence in Section 3.2. The point-estimate sign is unchanged under Laspeyres, Paasche, Fisher, and Törnqvist in both periods, although the magnitude is more formula-sensitive in 2019–2024. The sign is not mechanical and can differ across countries and periods.[6]

Chaining the two comparisons from a common value of 100 in April 2016 gives indices of 352.1 under plutocratic aggregation, 363.7 under democratic aggregation, and 344.1 for the published CPI by July 2024. The democratic-minus-plutocratic difference is 11.6 index points. These are cumulative differentials between chained exposure indices, not estimates of accumulated welfare loss or causal effects.

[6] Izquierdo et al. (2003) report a positive average plutocratic gap for Spain over 1991–1998, while Martin (2025) documents both signs and some formula sensitivity for the United States over 2002–2021.

5 Conclusion

Applying common national category prices to group-specific baskets in Malawi, we find higher inflation exposure for the bottom expenditure quintile, rural households, households whose heads have below-primary education, and female-headed households in both periods, under both aggregation operators. The gaps are considerably larger than those reported for high-income countries, and their ranking is not stable: the bottom–top gap is the largest in 2016–2019, while the education and rural–urban gaps overtake it in 2019–2024. Because all groups face the same price series, these gaps measure exposure arising from basket composition, not realized welfare change.

Food accounts for much of the expenditure, residence, and education gaps, partly offset by transport, while housing, water and energy is central to the female-headship gap. Within groups, higher-spending households generally hold baskets exposed to slower price growth, and this gradient is weakest among the four more exposed groups. Expenditure weighting therefore widens all four socioeconomic gaps. It also changes the sign of the age point estimate in both periods and of the household-size point estimate in 2016–2019.

Weighting differences also accumulate in the national series. Chained from April 2016, the household-average index reaches 363.7 by July 2024, compared with 352.1 under expenditure weighting and 344.1 for the published CPI. Yet changing the level of a national index cannot close the between-group gaps, because those gaps arise from differences in group consumption baskets. National inflation and between-group inflation inequality are therefore distinct measurement problems.

Declarations

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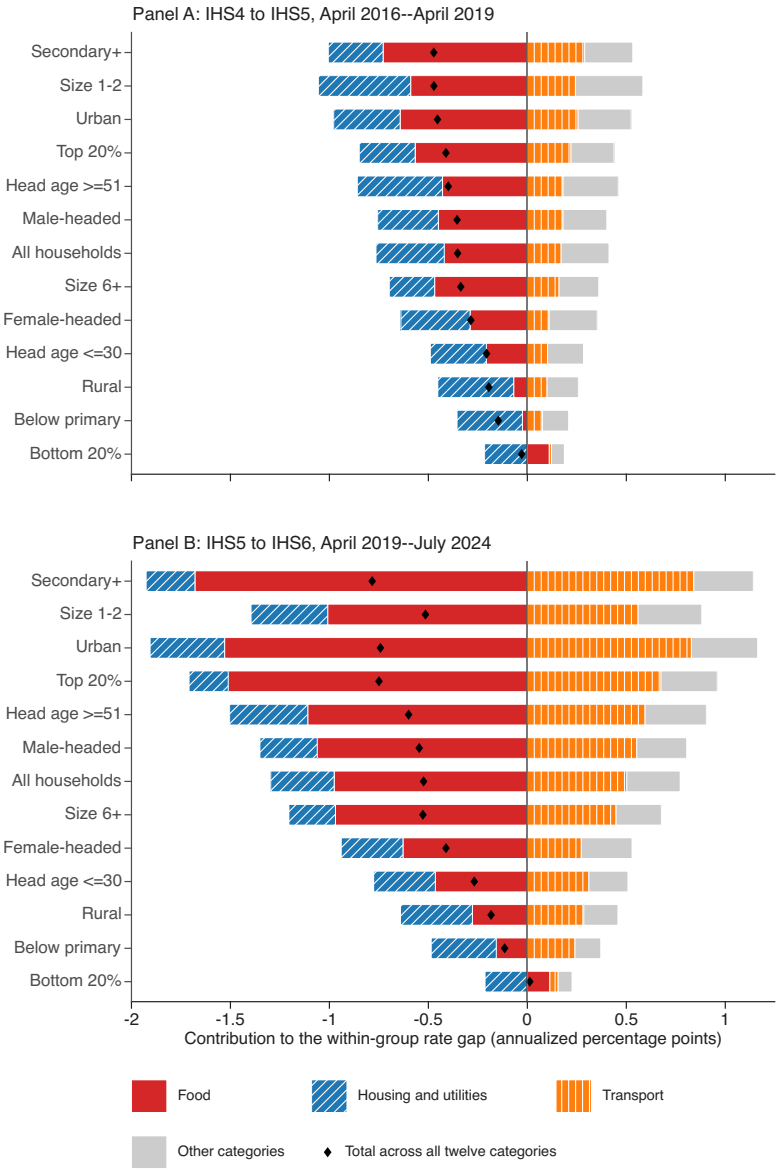


Fig. 4 Category Contributions to Within-Group Plutocratic Gaps

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A Variable Construction and Category Mapping

A.1 COICOP mapping

Table 6 IHS Expenditure Variables and COICOP Categories

Code	IHS variable	Category
CP01	`rexp_cat01`	Food and non-alcoholic beverages
CP02	`rexp_cat02`	Alcoholic beverages and tobacco
CP03	`rexp_cat03`	Clothing and footwear
CP04	`rexp_cat04`	Housing, water and energy
CP05	`rexp_cat05`	Furnishings and equipment
CP06	`rexp_cat06`	Health
CP07	`rexp_cat07`	Transport
CP08	`rexp_cat08`	Communication
CP09	`rexp_cat09`	Recreation and culture
CP10	`rexp_cat10`	Education
CP11	`rexp_cat11`	Restaurants and hotels
CP12	`rexp_cat12`	Miscellaneous goods and services

Notes: `Code` is the COICOP division code (CP01–CP12) used for the IMF price indices in Section 2. `IHS variable` is the IHS consumption-aggregate variable (`rexp_cat01`–`rexp_cat12`) from which budget shares are built. `Category` is the label used in Table 2 and throughout the paper.