A clearer view of the rock-bottom:
On poverty, hunger, and inflation

Mohamed Sultan

Abstract:

This paper attempts to review official measurements and provide alternative ones on the development of poverty and hunger in Egypt from July 2009 to July 2017. Alternative estimates rely on percentages and numbers of the hungry and the development of poverty[5] and hunger [6] based on a methodology that the paper proposes as a more accurate alternative to upgrade the values of poverty and hunger from one year to another and trace the development of both. The main difference between the methodology proposed by the paper and the official one is the approach used to upgrade the values of poverty and hunger, which change every two years. The paper proposes upgrading those values based on inflation rates pertaining to the poor and the hungry [7] instead of the general inflation rate on which official statistics

5- The paper uses the terms "poverty line" and "hunger line" as alternatives to Egyptian official "national poverty line" and extreme poverty line."

6- What is referred to as the "extreme poverty line" in official Egyptian statistics is not equivalent to the term of the same name used in international statistics. The international "extreme poverty line" is, in fact, equivalent to the Egyptian "national poverty light" while the Egyptian "extreme poverty line" is the closest to the international "undernourishment threshold."

7- In his study on official poverty indicators in India, Angus Deaton found that the percentage of the poor increases from 28.3% in official statistics to 31% if the poverty line is upgraded based on the poverty inflation rate rather than the general inflation rate as was the case with official measurements in India at the time. It is noteworthy that the main aspects of the methodology adopted in this paper are inspired by this study, See Angus Deaton (2008). "Price trends in India and their implications for measuring poverty." *Economic and Political Weekly* 43 (6): 43-49.

most likely depend for upgrades. Therefore, the main focus of this paper is reaching more accurate estimates on levels of inflation faced by the poor and the hungry and which differ remarkably from official inflation levels.

Introduction:

The main approach in calculating poverty lines in local or global methodologies is through determining a value or a price for the basic needs of individuals. Most numbers listed in statistics about poverty lines can in fact be described as the price an individual needs to pay in order to obtain the worst types of food, housing, clothes, healthcare, transportation, education… etc. The same applies to hunger lines, which represent the amounts of money needed to obtain the worst quality of food and the minimum quantity that keeps an individual alive without feeling hungry. Poverty and hunger rates are measures based on theoretical definitions that attempt formulating accurate, rather basic, definitions of poverty and hunger as "states." For example, these definitions answer questions like what the state of an individual is like when poor or hungry. This is followed by attempts to measure this "state" through "consumption," hence a "price." In other words, it is an attempt to decide the amount this individual needs to overcome the state of

poverty or hunger and individuals whose incomes are less than this amount will appear in statistics as poor or hungry.

What are the products consumed by the poor? The answer to this question is always predetermined even before conducting any official surveys on household expenditures. In official statistics, there is the "poverty basket" or the "minimum foods basket," which refers to the consumption that determines poverty and hunger. This means that an individual who consumes less than the contents of this basket is categorized as poor or hungry. The baskets themselves do not change as long as official definitions of poverty and hunger remain the same. What changes is the amount of money required to buy the contents of the basket and this is what official statistics attempts to find out every year or two.

When looking at poverty and hunger lines as prices, it becomes extremely easy to answer the question about what moves those lines from one year to another. The answer is the prices, the prices of goods and services used by the poor and the hungry. If the prices increase by 50% in one year, the poverty line also rises by 50% in the same interval[8]. However, defining states like poverty or hunger with

-8 There is a theory that the rise of poverty lines can differ from the rise of prices as a result of adaptation and changing expenditure patterns. This is based on

all their details through a number or a price that is unified internationally or within one country could create several complications and lead to inaccurate measurements. This is basically because the intensity of this "state" is never the same in all cases. Still, looking at poverty and hunger lines as prices can give an insight into many poverty and hunger developments on both the local and global levels and can, at the same time, be the main channel through which official methodologies in measuring poverty and hunger can be criticized. First, adopting the approach that views poverty and hunger lines as prices would be quite helpful in providing a clearer image of the rock-bottom in Egypt. **Figure (1) - Annexes**

The two lines in the above figure represent the change in the value of the official hunger line and the change in the general price index for the same interval. The word "general" poses a major problem here since the hunger line should be

the assumption that when the prices of products consumed by the poor increase, they first respond through decreasing the quantities they consume then they replace the products whose prices increase remarkably with more reasonable ones. This assumption might apply to several income levels, but definitely not to the poor and undernourished since their consumption and expenditure patterns are the least flexible and are devoid of any form of luxury. That is why it is hard to imagine that they have the choice to replace one product with another or to change their consumption behavior. However, this assumption is repeatedly used in official circles since partial separation between the movement of poverty lines and prices gives official statistics centers more freedom to identify the lines of poverty and hunger.

defined according to inflation rates pertaining to the hungry or price indices of consumers whose expenditure patterns are similar to those of the hungry. If the line of hunger is upgraded according to the general inflation rate, mistakes would most likely happen in estimating the value of the line of hunger. How big or small these mistakes are depends on the difference between the general inflation rate and the inflation rate of the hungry. It is important here to investigate whether the official line of hunger is updated according to the general inflation rate or according to a number of other different factor as official statistical entities like to promote.

The above figure compares the rise of the line of hunger and inflation during an interval that begins in July 2009 and ends in December 2015. If the rate with which the two lines rise is close, this means that the official line of hunger is updated according to general inflation rates. This can be clearly demonstrated in the interval between 2009 and 2011 where the line of hunger rose by 15.5% and the inflation rate by 15.9%, which explains why the two lines are adjacent at the beginning of the graph. The two lines grow apart after since in 2013 the line of hunger rose at a higher rate than the general inflation line and in 2015 the gap between the two widened as the line of hunger rose by almost 50% while the inflation rate rose by only 28%. The first explana-

tion of this gap between the two lines would be that the line of hunger is not only updated based on the general inflation rate but also according to other factors as claimed by official entities.

However, the result that appears in the above figure would seem less plausible if two facts are taken into consideration. First, during that interval, the general inflation rate rose by 15.9%. It is noteworthy that this percentage only covers a year and half, from January 2010 till July 2011. As for the 15.5% increase in the line of hunger, it covers an interval of two years, from July 2009 till July 2011. Therefore, there is an inflation rate for a period of six months that was not added by official statistics to the line of hunger for this interval. According to official statistics [9], the percentage of inflation for those six months is almost 6.7% and regardless of the reasons that drove official entities not to add this percentage to the line of hunger in the 2011 round if it was updated according to general inflation rate, the percentage of 6.7% almost constitutes the gap between the rise of the line of hunger and the inflation rate in the following round in 2013. This looks like the inflation rate that was overlooked in the 2011 round was added to the line of hunger in the 2013

9- Official data shows that the consumer price index for July 2009 was 93.7 for base year January 2010.

round. In other words, it can be said that the percentage of the rise in the line of hunger in the official income and expenditure survey for 2011 and 2013 is 40.60% and the percentage of the increase in the general inflation rate for the same interval is 40%. This means that the movement of the general inflation rate could explain the movements of the line of hunger by a percentage that exceeded 98% from July 2009 till July 2013 despite the gap that appears between the two lines in Figure (1).

The second fact is related to the wide gap between the movements of the two lines in the 2015 round. In October 2015, the World Bank decided to increase the value of the poverty line from USD 1.25 to 1.90 per day, that is by 52%. The percentage of the rise of the line of hunger, and also the line of poverty, in Egypt at that time was very close to 50% as if Egyptian official entities decided to make the value of poverty and hunger lines similar to global percentages regardless of local inflation rates. Several indications demonstrate that updating the line of hunger in the 2015 round was done to be in line with global estimates. One of the most obvious indications is the fact that the Central Authority for Public Mobilization and Statistics overlooked the usual timeframe it follows to conduct the periodic income and expenditure survey. Since 2008-2009, the income and expenditure sur-

vey started being conducted every two, starting in July and ending in July, instead of five years. However, this was not the case in 2015 where the survey covered two years and a half that started in July 2013 and ended in December 2015 as if the survey aimed at coinciding the percentage of the increase and its timing.

Those two facts, in addition to the numbers in the figure above, demonstrate that the Egyptian line of hunger is updated according to the general inflation rate and that this local approach was overlooked at the times of global updates. Despite the fact that the survey did not adopt a unified methodology and shifted between local and global methodologies, which resulted in inaccurate results, yet the shift towards the global approach in 2015 had a positive impact on accumulated standard deviations in the Egyptian hunger line in the years before 2015. The main reason for what this paper argues are deviations or miscalculations in the estimation of the Egyptian line of hunger is the survey's dependence on the general inflation rate in its updates since the general consumer price index is not likely to accurately identify the inflation level facing the hungry, hence is incapable of updating the line of hunger correctly.

Inflation rates for the poor and the hungry:

Calls for developing inflations rates for the poor and the hungry give the impression that these are only political or social demands, but in the context of this research this is also a technical necessity in order to know the numbers of the poor and hungry to start with. This will not be possible without looking at the inflation rates they particularly face.

According to the Central Authority for Public Mobilization and Statistics, the line of hunger is a line that demarcates a group of people whose income is not enough to satisfy their basic needs of food. Those people are restricted to one item of expenditure and that is why inflation in the prices of food is only what affects them and not general inflation that includes other expenditure items such as culture and entertainment, hotel and restaurant services, private car expenses, and other items that do not apply to the hungry. Even official statistics on inflation demonstrate that inflation rates in food are quite different and are usually higher than that in other items included in general inflation.

This difference can be easily detected in Table (1) that shows the different items in the general inflation rate, including food, and shows how the inflation rate in food is higher than in other expenditure items such as education,

housing, or transportation, therefore higher than the standard consumer price index. This table shows that if the line of hunger is updated through the official food price index, it will most likely increase much faster than when it does through the general inflation rate.

Table (1)
Consumer price index: Urban
January 2010= 100

	June 2010	June 2011	June 2012	June 2013	June 2014	June 2015	June 2016	June 2017
Total number	102.4	114.5	122.8	134.8	145.9	162.5	185.2	240.3
Food & beverages	105.9	126.0	137.6	155.0	172.6	191.4	225.1	315.8
Housing, water, electricity, gas & fuel	99.3	100.4	107.7	113.1	117.1	124.2	130.8	140.9
Healthcare	100.0	101.9	102.0	114.8	128.6	131.2	172.5	194.3
Transportation	100.6	101.7	104.5	107.3	114.2	139.2	144.2	181.6
Education	100.0	124.3	136.6	152.2	157.9	196.9	219.0	246.0
Miscellaneous goods & services	100.7	103.2	104.5	105.3	106.3	111.5	121.1	159.8

Source: Central Agency for Public Mobilization and Statistics

What makes the situation more complicated is that the food inflation rate in official statistics is still not related to the hungry. Also, the line of hunger cannot be addressed through the official food inflation rate because the food basket in the official index too needs to be fixed in order to be close to the expenditure pattern of the hungry on food.

The main problem in the official food inflation rates is that they are calculated based on an expenditure pattern similar to that of classes with medium-income and not the poor or the hungry. The following table shows official spending percentages on food in the expenditure and consumption survey for 2015. It illustrates the large difference between the officially generalized pattern and the expenditure pattern of the hungry. For example, it is not logical to assume that a hungry individual spends on meat, fish, and fruits almost 45% of his/her income, which is not enough for satisfying his/her hunger with the worst type of food to start with.

Table (2)

Spending percentages on food and beverages

The official figures

Meat	29.8%
Vegetables	13.9%
Milk, cheese, and eggs	13.7%
Grains and bread	11.2%

Oils and fats	7.9%
Fish	6.7%
Fruits	6.4%
Sugar and sugary foods	4.7%
Beverages	3.7%
Other products	2%

Source: Central Agency for Public Mobilization and Statistics, "Income, Expenditure, and Consumption Survey for 2015."

The problems that arise in the official general expenditure pattern is repeated in the expenditure pattern on food. A question arises about the food products mainly consumed by the hungry such as grains, bread, vegetables, oils, and sugary products and what if their prices increase at a higher or lower rate than products which occupy a relatively large place in the official general expenditure pattern such as meat and fish. In this case, food inflation rate in the official statistics will not reflect the inflation faced by the hungry. This gap recurs frequently in Egypt as will become obvious in the following analysis.

Before looking at the results of the consumer price index for the hungry proposed by the paper, it is important to underline the necessity of revising inflation rates used to update the lines of poverty and hunger in Egypt. Official statistics in Figure (2) suggest that the percentage of increase or decrease is very minimal, presumably 5% in the value

of the poverty line. This small percentage could increase or decrease the percentage of the hungry population by more than 20%. **Figure (2) - Annexes**

Figure (2) shows the distribution of household annual income based on the income and expenditure survey for 2015. The lines of poverty and hunger are calculated to represent their annual value per household.[10] Hungry households are those below an annual income of LE 16,000 and poor households below 26,000. The figure shows how dense the area is in the graph where the lines of poverty and hunger are situated.

According to official statistics in 2015, the percentage of the hungry is 5.3% and the poor 27.8%, which means that the extremely narrow area between the lines of hunger and poverty, which is almost LE 10,000 annually per household, contains 22.5% of Egyptians. It is possible to understand the density of the area between the two lines through comparing it to the upper area in the income distribution map. Less than 20% of households are located in the area between annual incomes of LE 55,000 and 7 million. This

10- Values of poverty and hunger lines in the graph are approximate since the number of individuals in poor and hungry families are not accurately identified in official data. That is why it is hard to change the line of poverty or hunger for an individual to one for a family. However, the difference between actual and estimated figures is unlikely to be too substantial to affect the analysis that rely on those estimates.

means that there is an area of more than LE 6.8 million occupied by a number of households less than that occupying the narrow area of LE 10,000 between hunger and poverty lines. Based on official statistics, the LE 10,000 area is the second denser in the Egyptian income distribution map and the densest is the LE 10,000 right above the poverty line and which is occupied by more than 24% of households.

Official statistics in the above figure state that if the poverty and hunger lines move slightly to the right or to the left, the numbers and percentages of the poor and hungry will differ remarkably. This is because the areas in which they will move are dense enough to make the slightest increase or decrease in their value equivalent to millions more or less in the number of the poor and the hungry. This data underlines the necessity of carefully examining inflation rates through which poverty and hunger lines are addressed in order to be able to determine the numbers of the poor and the hungry and work on reducing them.

Results of the consumer price index for the hungry:

The paper attempted to develop an index to measure the inflation rate for the hungry in the interval between July 2009 and July 2017 as a means of updating the Egyptian hunger line based on the results of this index. What distinguished

this index from the general official consumer price index is that in this one, the hungry spend 100% of their income on food[11], not 39.9% like the official index. Also, the index designed for the hungry is distinguished by two main modifications.

The first modification is related to the percentage of spending on different food items so that it would be close to the expenditure pattern of the poor and the hungry. This can be done through, for example, reducing the spending percentage on meat, fish, and fruits from 44.4% of the income spent on food as illustrated in the official index to 22% in the new index. This should be coupled by increasing the spending percentage of a number of food items such as rice, fava beans, and bread by 24.2% followed by vegetables to

11- Observations on the ground prove that even individuals below the hunger line according to both domestic and international standards do at times spend money on items other than food even if not frequently. This assumption could substantially change the methodology of calculating hunger rates on both local and international levels. For example, according to the international methodology, people who consume less than 1,800 calories per day are considered hungry. This means that the monetary value of 1,800 calories can be set as the daily international hunger line. However, because even the hungry have financial commitments other than food, they might have the monetary value of 1,800 calories, but actually consume less calories since the money is not only spent on food. It is likely that individuals in Egypt own a little more than LE 322, which is the monetary value of the official hunger line yet are incapable of buying their basic needs of food because part of income is spent on other items. Because this research does not use official methodologies to measure poverty and hunger and because there are no local or international estimates of non-food items on which the hungry spend money, the paper will assume an expenditure percentage of 100% on food since this is more representative of the expenditure pattern of the hungry than the percentage used in Egyptian official statistics.

reach 21% then meat, poultry, fish, then dairy products, cheese, and eggs as shown in Table (3) in the appendices.

The second modification is crossing out the inflation rates on subsidized goods. This modification is based on the theoretical assumption that the hungry could get products like bread, sugar, and oils with subsidized prices, which means they will not be affected by the changes of market prices. That is why inflation rates on these products were crossed out for the interval from 2009 to 2015. In other words, it is possible to say that a percentage of 10.8% of income in this index is subject to an inflation rate of 0%. In addition to taking into consideration state support, this calculation method also reduces the possibility of producing exaggerated inflation rates. The percentages crossed out of inflation rates can be considered correction coefficients that aim at avoiding exaggerated estimates that can result from relying on approximate expenditure patterns.

Some expenditure percentages in the index such as 20.9% on vegetables or 24.2% on grains and bread are approximate and not based on field surveys. The detailed pattern of the food consumption of the hungry remains quite vague whether in Egyptian or international statistics. Methodologies calculating the "prevalence of undernourishment" in

international statistics such as that used by the Food and Agriculture Organization (FAO) assume that the hungry are those whose daily consumption ranges between 1,400 and 2,100 calories per person [12] without accurately specifying the type and quantity of products from which they can get the minimum amount of calories. The same applies to Egyptian official statistics that place a monetary value on minimum expenditure on food that keeps individuals alive, which was LE 322 per month, without detailing the expenditure pattern of this segment or how this amount is distributed among different types of food. An approximate expenditure pattern, that is inflation rates produced by this approximate index, is unlikely to reflect the inflation faced by the hungry. However, the numbers produced by the new index are most likely to be closer to the inflation rates faced by the hungry than general inflation rates.

It is noteworthy that modifications were made to expenditure only. As for the prices of products and the percentages of their increase, the alternative index relied on the official prices listed in the monthly reports on the average prices of the main food products.

12- FAO, Sustainable Development Goals, Indicator 2.1.1 – Prevalence of undernourishment, Methodology:
https://unstats.un.org/sdgs/metadata/files/Metadata-02-01-01.pdf

Figure (3) shows the difference between the inflation rate for the hungry on one hand and the official general and food inflation rates on the other hand in the interval between July 2009 and July 2017, calculated through the previously mentioned methodology. **Figure (3) - Annexes**

Inflation rates for the hungry in the above figure are the result of the alternative consumer price index that was previously explained. The wide gap between inflation rates for the hungry and general inflation rates can be easily detected.

Between 2009 and 2011, inflation rates faced by the hungry, estimated at 42.2%, almost reached double the general inflation rate, calculated at 22.6%. This difference is attributed to the remarkable hike in the price of vegetables as well as grains such as rice, beans, and wheat, with an index of 208, compared to slight increases in items with the same expenditure percentages in general inflation rates such as housing expenses and healthcare, with an index of 107 for the same interval.

Looking at the numbers in the previous figure reveal that the gap between the inflation rate for the hungry and the general inflation rate is an unstable one since it keeps narrowing and widening. This instability becomes clearer if inflation rates for the hungry are compared with official food infla-

tion rates, for in most years the gap between them is small. At times, the gap shows that the inflation rate for the poor is higher than the food inflation rate as was the case from 2009 till 2013. At other times, the two are very close as was the case between 2013 and 2015. Then the food inflation rate rises remarkably over the inflation rate for the hungry as was the case in the interval between 2015 and 2015 as a result of the increase in the prices of food products which are not frequently consumed by the hungry such as meat, fish, and fruits.

This instability in the gap shows that available official indicators, whether general inflation rates or food inflation, cannot be an accurate means for identifying inflation rates for the hungry. In case the gap was quite stable between any of the official inflation rates and inflation rates for the hungry, it would be statistically easier to estimate the number of the hungry based on general inflation rates through adding or subtracting the value of the gap. However, the previous analysis does not only confirm that there is a gap, but that this gap widens at times to reach 90% and at others drops to less than 1%.

This situation increases the necessity of conducting official field surveys to develop indicators for the poor and the hun-

gry or at least make available detailed information that help in developing those indicators in a way that depends less on estimates. **Figure (4) - Annexes**

Statistics and deviations: A historical context:

Figure (4) shows the value of the official hunger line compared to the alternative one that was updated through using inflation rates for the hungry. The base year in this figure is 2009 and that is why the two lines are adjacent for that year. The wide gap between that two lines can be noticed, which means that official hunger percentages announced particularly in years 2011 and 2013 were much less than it is if the line of hunger is updated through inflation rates for the hungry. While years 2007 and 2008 are linked in the minds of economists with the global financial crisis, in economic circles focusing on food, the crisis is referred to as the 3Fs (food, fuel, and financial crisis). In 2008, global prices of food increased remarkably then increased once more in 2010-2011. **Figure (5) - Annexes**

At that time, international financial institutions such as the World Bank paid more attention to the issue of food security in the Arab region. For the World Bank[1314], the Arab region

13- World Bank,FAO,IFAD (2009a), Improving Food Security in Arab Countries (Washington, DC, World Bank)

14- World Bank, (2009b), Operations: targeted food support to vulnerable groups affected by high food prices.

has the highest percentage of food demand in the world, which increases the food crisis there especially in light of the rising prices. This proves that statistical deviations in hunger measurements in Egypt at the time must have occurred. There are also political reasons for these deviations. At a time when global prices of food were rising remarkably and fear of a food crisis echoed across the world especially in the Arab region, statistics released in Egypt sounded quite unrealistic. According to official statements, despite the international crisis and political upheaval that started in 2011, Egypt still managed to reduce the number of the hungry from 6.1% in 2008-2009 to 4.8% in 2010-2011. While these figures could seem a remarkable success, they are not logical statistically. Unfortunately, the percentage of 4.8% in 2011 was most likely the result of measurement errors rather than an actual reduction in the number of the hungry. What makes the situation more complicated is that hunger measurements in the years the followed depended on this percentage. This means that such mistakes will continue to impact future measurements[15].

Table (4), which is one of the results of Dina Abdallah's

15- The continuous impact of previous miscalculations also applies to the hunger line. The alternative methodology applied in the paper used the official hunger line value in 2009 as a base year, which means that any miscalculations of this value at the time will be reflected in later estimates.

paper, published in this book, presents the percentage of the hungry based on the alternative line of hunger compared to the percentage announced in official statistics in accordance with income distribution in the official expenditure and consumption survey for the years subject of the study. The table shows a different history of hunger in Egypt. Millions will be added to the hungry if a more accurate methodology is used. In 2011, the percentage of the hungry rose from 4.8% in official statistics to 9.6%, which translated into 7.6 million people, almost half of whom were not in official statistics. In 2013, the hungry reached 8.1 million, 4.4 million of which did not appear in official statistics. In 2015, which is a very important year as far as the accuracy of the alternative methodology is concerned, there was a difference of around two million people between official and alternative methodologies. However, this was one of the years in which the percentages in both were the closest compared to other years subject of the research. Table (4) shows that the official and alternative hunger lines are very close. In order to understand the significance of this closeness, it is important to examine global methodologies used to measure poverty and hunger.

Table (4)

Year	2010-2011	2012-2013	2015
Official percentage of the hungry	4.8% 3.820 million people	4.4% 3.728 million people	5.3% 4.770 million people
Alternative percentage of the hungry	9.6% 7.641 million people	9.3% 8.133 million people	7.2% 6.750 million people

Source: Dina Abdallah's paper "The accuracy of statistical samples"[16]

Will global poverty and hunger lines yield more accurate statistics?

In January 2018, the price of one liter of full-cream milk in Greater Cairo was LE 13.35 while in New York its price for the same time was USD 1.14, that is LE 20.36 according to the exchange rate at the time. For this reason, economists developed Purchasing Power Parity (PPP) index.

16- Although the Central Authority for Public Mobilization and Statistics in Egypt considers the partial sample it makes available on income representative of the complete sample, yet the paper opted for relying on correction coefficients to ensure the accuracy of the results of the partial sample or to reduce the discrepancy between the partial and complete samples. Correction coefficients were calculated through measuring the slight difference between the results of the partial and complete samples at certain points. Using correction coefficients made the percentage of the hungry based on the partial sample appear in the form of a range, from 7.2% to 9% for example, in 2015 and Table (4) shows the minimum of this range whose numbers and calculation methodology are detailed in Dina Abdallah's paper.

If the price of milk and other goods and services was the same in Cairo and New York and other cities across the world, poverty measurements would be much less complicated than they are now. In this case, the value of the global poverty line, which is USD 1.9 per day, could be applied to any other country. However, because prices across the world are relative and are not unified, the prices of goods in many countries cannot be determined by market exchange rates. That is why market exchange rates cannot be an accurate tool to convert the value of the global poverty line into a value in the local currency of a given country. What is needed is an exchange rate that when used with the price of milk in New York gives the same amount as that in Cairo and other parts of the world. This exchange rate is what economists call Purchasing Power Parity Exchange Rate and it is the result of the PPP price index.

It can be said that the PPP aims at measuring changes in the purchasing power similar to the Consumer Price Index (CPI) used to measure general inflation in Egypt. However, the CPI aims at detecting changes in the purchasing power of the Egyptian pound across time, which means comparing what goods the Egyptian pound could buy in January 2017 to what it can buy now. The CPI, therefore, compares different phases of the Egyptian pound's purchasing power. PPP,

on the other hand, examines the changes in the purchasing power of the Egyptian pounds across time and also across different countries. The methodology of the PPP facilitates both temporal and spatial comparisons so that the percentage and number of the poor in Egypt can, for example, be compared to India. This is because all those percentages were produced through one criterion, which is PPP. The question is whether the PPP can offer a better methodology than the local one used to measure poverty and hunger.

The PPP resembles in many ways local CPIs. Both feature an expenditure aspect that includes spending on food, healthcare, and education, but expenditure percentages in the PPP usually come from the national accounts of the state and not from household surveys as is the case of conventional CPIs. There is also a prices aspect, which are the same used in conventional CPIs. Through those two aspects, the PPP calculates changes in exchange rates. The similarity between PPP, which is internationally recognized to update poverty lines on the global level, and the CPI, used to update poverty lines locally, is not only in their structure, but also their level of accuracy since both have the same setbacks in calculating inflation rates for the poor and the hungry.

Angus Deaton, who received the Nobel prize in economics

in 2015, criticized traditional means of measuring poverty, inequality, and welfare. He particularly criticized official PPP indices[17][18][19]. Deaton proposed alternative indicators that he called Poverty-Weighted Purchasing Power Parity Exchange Rates (PPPP). The main modification proposed by Deaton is the same examined in this paper as far as the Egyptian consumer price index is concerned. Deaton argues that expenditure percentages in official PPP are not similar at all to the expenditure patterns of the poor. What determines the volume of expenditure percentages in national accounts could be the price of a given commodity and the quantities in which it is consumed in general, but not how much the poor in particular spend on it. That is why spending on luxury and durable goods can appear in exaggerated percentages in national goods only because their prices are high compared to consumer goods on which the poor spend almost all their money. There are many reasons that make expenditure percentages in national accounts, hence the PPP index, incongruent with the expenditure patterns of the

17- Angus Deaton and O Dupriez. 2011. "Purchasing power parity exchange rates for the global poor." *American Economic Journal: Applied* 3: 137-166

18- Angus Deaton 2010. "Price indexes, inequality, and the measurement of world poverty." *American Economic Review* 100 (1): 5-34

19- Angus Deaton. 2013. "Reshaping the world: The 2005 Round of the International Comparison Program." Measuring the size of the world economy: the framework, methodology, and results from the International Comparison Program. Washington, DC: World Bank

poor and the hungry even more than the conventional CPIs. Table (5) contains expenditure percentages in the Egyptian PPP index in the last update (2001) in effect till the present moment. **Table (5) - See appendices**[20]

Expenditure percentages in this table underline the mistakes that are bound to happen if the same indicator is used to calculate inflation rates for the poor and the hungry. For example, spending on food is estimated at 33% in this table and not 100% as is the case of the hungry or 67% as is the case of the poor [21]. In other words, if Deaton's methodology is applied on Egypt's PPP to make it closer to the expenditure pattern of the poor and the hungry, the gap revealed will be bigger than the one between the official consumer price index and that of the poor and hungry. This is because the PPP index is more deviated from the expenditure pattern of the poor and the hungry than the official consumer price index. Unlike what is commonly believed, adopting a global methodology to measure poverty and hunger can result in more accurate numbers and percentages of the poor and the hungry. The above-mentioned data show that that the periodic mechanism employed to update the pov-

20- Source: International Comparison Program (ICP). World Bank: https://goo.gl/1aLw17

21- The source of this percentage will be addressed in the section on the consumer price index for the poor.

erty line every year suffers from the same setbacks as local methodologies and are most likely more deviated from the expenditure patterns of the poor and the hungry in underdeveloped countries.

This demonstrates the necessity of conducting non-periodic updates of the poverty line such as the update conducted in 2005 from USD 1.08 to 1.25 per day then in 2015 to become 1.90. This increase in the value of the global poverty line could relatively reduce the impact of the setbacks of the periodic updates conducted through the PPP. Non-periodic updates can be considered an attempt to add inflation rates that the PPP index could not detect in the years between one update and another [22]. The more defective periodic updating mechanisms are, the more urgent the need is for non-periodic updates.

As previously mentioned, the rise in the official poverty line recorded in Egypt in 2015 was an attempt to be in line with the updated global poverty line that rose by 52%. As a result, the Egyptian poverty line rose by 50% despite the fact that the official inflation rate and the food inflation rate

22- There is a form of simplification in looking at the percentage of increase in non-periodical updates of the global poverty line and which are seen as inflation rates added to those that the Purchasing Power Parity (PPP) could not detect. This could have been accurate had the base year for PPP indicators not changed, but had they changed, which is usually the case, the inflation added by non-periodical updates is less than the percentage that appears in the updates.

did not exceed 28%, which means that an inflation rate of almost 22% was added to the Egyptian poverty line to be in line with the global update.

It can be said that the local Egyptian methodology benefited from the global update of the poverty line to add inflation rates for the poor and the hungry and which the official consumer price index could not detect and add in the years before 2015. Therefore, the point at which the Egyptian poverty line stopped in 2015 is more accurate than the point at which it would have stopped without the global update.

It is possible to review the official poverty and hunger lines calculated through the consumer price index, particularly in 2015. It is worth noting that the calculated hunger line did not take into consideration the global update that took place in 2015 as the percentage of its rise is only calculated based on the consumer price index for the hungry. However, its value in 2015 was close to and is still higher than the value of the official hunger line after the update. This means that the periodic updating mechanism does not overlook many of the inflation rates faced by the hungry across time as is the case of the CPI or the PPP. In other words, this methodology can result in less deviations than those resulting from official methodologies as it does not require frequent

non-periodic updates to set its previous deviations straight.

Figure (6) - Annexes

Of course, it is not possible to assume that the methodology proposed in this paper does not require non-periodic updates or field surveys to modify it and ensure its accuracy. However, this alternative methodology would require less non-periodic updates or more time in order for its annual deviations to require non-periodic updates or the addition of corrective inflation rates. Most importantly, the accuracy of this methodology means gaining access to more accurate statistics on the poor and the hungry in the intervals between non-periodic updates and comprehensive field surveys.

According to inflation rates for the hungry in the interval between December 2015 and July 2017, the value of the Egyptian hunger line in 2017 should be LE 509 per month without taking into consideration the rise in the value of the global poverty line in 2015. This means that this value constitutes the minimum estimate of the line of hunger according to the global or local methodology. This number means that a family of three individuals only has to have an income of more than LE 1,527 so that they are not categorized as hungry. This number is higher than the minimum wage in Egypt. It is noteworthy that according to the in-

come and expenditure survey, most families categorized as hungry are made up of 5-6 members, which means that the line of hunger will range between LE 2,550 and LE 3,055 per month. According to the Egyptian tax system, if the income of these families comes from only one or two of its members, taxes will be deducted from them as if they work in the formal economy. This means that the tax system does not take into consideration the fact that hunger lines rose so substantially so that even the incomes of individuals categorized as hungry are taxable. Note that this is this case of the hungry and not the poor, whose incomes are around 33% more.

What moves the Egyptian line of poverty?

As was the case with the line of hunger, it is important to know what moves the line of poverty and whether the two lines rise in similar percentages. Figure (6) compares the percentages of the rise of the general inflation rates and the official poverty line from July 2009 till December 2015.

Figure (7) - Annexes

Unlike the results of the official poverty line, the figure shows that the official poverty line always rises with higher rates than the general inflation rate or that the rate with which the poverty line rises is different from and not expli-

cable through the general inflation line. This separation between the two lines is an initial indication of the accuracy of official poverty statistics in Egypt, which most likely do not rely on the general inflation rate only. This separation also underlines a statistical bias in official calculations. While inflation rates for the hungry are higher than those for the poor and general inflation rates, percentages of the rise of the official poverty line are higher than those of the official hunger line in the years 2011 and 2013. The second question is whether the official poverty line rises in accordance with an inflation rate for the poor.

Consumer price index for the poor:

Similar to the previously mentioned methodology on the consumer price index for the hungry, the paper attempts to calculate a consumer price index for the poor. There are main differences, however, between the two. The first of those differences is spending on food. In this index, the poor spend 67% of their income on food and this percentage, despite not being stated directly in official income and expenditure surveys, is quite approximate for many reasons, on top of which is the fact that official Egyptian statistics are the source.

The spending of the poor on food can be deduced through

the percentage of the value of the hunger line to the percentage of the value of the poverty line in Egypt. According to the Egyptian, or rather logical, definition the poor are more privileged than the hungry or have an income that enables them to spend on items other than food. This means that their expenditure is divided between food and non-food components, the latter including housing, education, transportation, clothing, and footwear. Since minimum spending on food according to official methodology is the value of the hunger line, the percentage between the hunger line and the poverty line can accurately represent the percentage the poor spend on food. The percentage between poverty and hunger lines was 75% in 2009, 67% in 2011, 65.5% in 2013, and 66.8% in 2015. The percentage most repeated in these years was considered the percentage the poor spend on food during this interval, which is quite close to percentages concluded by global statistics[23][24] on the percentage of spending by the poor. The remaining 33% of the income are distributed among the main expenditure items in an approximate manner, as demonstrated in detail in Table (6).

23- "Food prices remain high in developing countries." FAO: https://goo.gl/2TxHQv

24- "How High Food Prices Affect the World's Poor." World Food program, September 2012: https://goo.gl/E28AJ3

Table (6) See appendices

Based on inflation rates calculated through the consumer price index for the poor, Figure (8) attempts to compare inflation rates for the poor with the percentage of the change of the official poverty line in the years between 2009 and 2015. **Figure (8) -Annexes**

Unlike wide gaps detected between inflation rates for the hungry and the percentage of the rise of the hunger line, the above figure shows that the gap between alternative inflation rates for the poor and the percentage of the rise of the official poverty line, and also the gap in 2013 between the two lines, can be attributed to the six-month difference in the base year in the 2010-2011 survey mentioned in the section about the line of hunger.

In numbers, it can be said that the gap between the two lines in the years between July 2009 and July 2013 does not exceed 2.4%. This closeness between the percentage in the rise of the two lines can be seen as an indication that updates of the official poverty line are relatively close to the inflation rates faced by the poor. Although the alternative inflation rate for the poor from July 2013 to December 2015 was 28.7%, calculation in the previous figure underlines a preference to adopt the percentage of rise in the global pov-

erty line as updated in 2015, which is 52%. This preference raises the question of how effective the consumer price index for the poor calculated in this paper is.

The possibility of developing a consumer price index for the poor:

Information released by the Central Authority for Public Mobilization and Statistics in Egypt on the price of food made it possible to develop a consumer price index for the hungry that is probably more accurate than that for the poor. The main reason for the inaccuracy of the index for the poor is lack of information on many products on which the poor spend their money. Transportation and housing could serve as good examples.

Transportation:

Official inflation rate in transportation is calculated based on a particular expenditure pattern: buying private cars including paying installments (26.8%), maintenance and operation of private cars (25.8%), and other means of transportation such as the subway, taxis, microbuses… etc. (47%) [25]. Since the latter is the only item on which the poor spend money and is represented by less than 50% of the

25- Tables 1 and 2, pages 12-14, "Income, Expenditure, and Consumption in Egypt- 2015." Volume 4.

percentage of spending on transportation in the official rate, it is likely that the inflation calculated in this index does not reflect the inflation faced by the poor in transportation.

Despite this defect in the official expenditure pattern on transportation, official information on development of the prices of public and private transportation in Egypt does not allow for the calculation of an inflation rate for the poor in this category. What is known is the recent increase in the prices of subway tickets and transportation costs following fuel price hikes in 2014, 2016, and 2018. All those changes appear in less than their values in official inflation rates because they deal with an expenditure percentage of 47% and not 100% as is more likely with the poor.

Housing:

This category contains inflation rates that are most likely much less that those faced by the poor. It is hard to modify those rates accurately for the same reasons already mentioned in the transportation category.

The percentage of rent is 6.6% of total spending on this category while spending on electricity, gas, and other bills is 16.4%. Those two items, which represent 23% of spending on housing, most likely constitute 100% of the spending of the poor on housing. Another reason that leads to question-

ing official inflation rates in this category is that the highest expenditure percentage in this category is financial leasing where price hikes are approximate, which means they are calculated based on official, and not market, estimates, of the increase in housing prices. That is why official price hikes in the housing category are much less than actual inflation rates facing the poor. This can be noticed through looking at official price hikes in this category during years where the values of electricity, water, and gas bills increase remarkably.

Table (6) attempts to compare the percentage of the rise in utility bills with official inflation rates in the housing category.

Table (6)

Year	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018
Annual increase in electricity bills	3.8%	56.8%	4.8%	46.6%	22.4%
Annual increase in housing & maintenance	3%	6%	5.3%	7.7%	18.3%

Source: The Central Authority for Public Mobilization and Statistics, the Egyptian Initiative for Personal Rights, and the Built Environment Observatory[26]

26- Inflation information in the housing category are from the Central Authority for Public Mobilization and Statistics while price hikes in utility bills for 2017-2018 are from the Egyptian Initiative for Personal Rights and the Built Environment Observatory.

These remarks about transportation and housing underline the setbacks of the official consumer price index due to its inability to accurately detect inflation rates for the poor. This, in fact, is the setback that the consumer price index for the poor could not address due to lack of enough information about the development of transportation and housing prices for the poor. That is why it was hard to develop a consumer price index for the poor that is not affected by the biases of the official index despite modifying expenditure percentages on food and adding the slight changes in transportation and housing prices. For this reason, it is possible to say that even though official updates of poverty lines are quite close to inflation rates calculated through the alternative consumer price index for the poor, this closeness does not necessarily mean that official updates are accurate. This is because the criterion based on which this accuracy is determined, which is the consumer price index for the poor, is still defective and unable to accurately detect housing and transportation inflation rates for the poor. Despite this defect, which cannot be fixed through the available data about official poverty measurements in Egypt. This data is still more accurate than that available on hunger measurements in Egypt.

The main component of the alternative methodology proposed by this paper is presented in Figure (8). The figure

features three lines and not one like what is usually presented by official entities. There is a difference in the level of inflation that varies in accordance to the income level. This is a fact that cannot be overlooked any longer since without taking it into consideration, it is impossible to get an accurate view of inequality, poverty, and hunger. Sometimes the three lines get close, but this does not mean they can be reduced to one line all the time. This coincidental closeness between the lines in the figure is because at a certain moment the percentage of price hikes in all expenditure categories were quite close, which is not sustainable in all cases. The lines that are currently close will start drifting apart in a while. Therefore, if we do not have a methodology to measure inflation based on income, as is the case now, deviations will occur in several economic measurements, including poverty and hunger. **Figure (9)- Annexes**

Appendices

Table (3)

Consumer price index for the hungry

	Expenditure percentage			July 2009 to July 2011 Inflation rate (%)	July 2011 to July 2013	July 2013 to Dec 2015	Dec 2015 to July 2017
Total inflation	**100%**			**42.221**	**24.613**	**28.203**	51.44
Fruits & vegetables	**25%**			**13.976**	**9.5939**	**12.532**	9.69

		3%	Potatoes	1.3002	2.2737	0.7062	-0.87
		3.30%	Tomatoes	4.0425	-0.5676	1.914	0.1155
		1.25%	Onions	1.7988	-0.0788	0.9285	1.4875
		1%	Local garlic	0.6915	-0.2873	0.9285	1.17
		1%	Lemons, peppers & carrots	0.23	-0.003	0.23	1.57
		3%	Eggplants	0.225	3.18	-0.453	3.012
		3%	Zucchini & cabbage	0.225	0.057	2.406	0.1
		2%	Cucum-bers	1.206	1.062	1.6	-0.14
		3.30%	Beans	2.409	1.1418	1.2969	0.1914
		4.40%	Fruits	1.848	2.816	2.9744	3.0536
Grains & bread	**24.200%**			**16.628**	**3.105**	**3.974**	9.63

		10%	Rice (loose and packed)	10.24	1.34	0.4	4.82
		4%	Wheat	1.236	0.477	0.438	2.346
		8%	Fava beans	5.152	1.288	3.136	2.464
		3.20%	Bread	0	0	0	0
Meat, poultry & fish	**17.50%**			**6.6325**	**5.4775**	**4.0775**	**10.238**
			Average price				
			1 Kilo of local beef				
			1 kilo of white chicken				
			1 kilo of tilapia fish				

Milk, cheese & eggs	**16.70%**			**3.0506**	**5.0913**	**5.9072**	**7.2783**
			Average price				
		10%	Cheese & milk basket	1.59	1.48	4.46	4.27
		6.70%	Eggs	1.4606	3.6113	1.4472	3.0083
Sugar, sugary foods, oils & fats	**10.60%**			**0**	**0**	**0**	**11.235**
		4.70%	Sugar	0	0		
		5.90%	Oils & fats	0	0		6.8103
							4.425
Other food & beverages	**5.70%**			**1.938**	**1.3452**	**1.7132**	**3.3687**

Table (5)

Expenditure percentages in purchasing power parity (PPP): Egypt 2011

Table D2 DETAILED RESULT: Expenditure shares (GDP = 100)												
Expenditure shares (GDP = 100)	Gross domestic product	Actual individual consumption	Food and nonalcoholic beverages	Alcoholic beverages, tobacco, and narcotics	Clothing and footwear	Housing, water, electricity, gas and other fuels	Furnishings, household equipment and maintenance	Health	Transport	Communication	Recreation and culture	Education
(00)	(01)	(02)	(03)	(04)	(05)	(06)	(07)	(08)	(09)	(10)	(11)	(12)
Egypt, Arab Republic	100.0	79.5	33.3	2.6	4.8	10.4	3.8	7.3	4.7	2.0	2.4	5.3

Restaurants and hotels	Miscellaneous goods and services	Net purchases abroad	Individual consumption expenditure by households	Individual consumption expenditure by government	Collective consumption expenditure by government	Gross fixed capital formation	Machinery and equipment	Construction	Other products	Changes in inventories and valuables	Balance of exports and imports	Domestic absorption	Individual consumption expenditure by households without housing
(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
2.5	5.6	-5.2	75.6	4.0	7.5	16.7	7.8	8.5	0.5	0.4	-4.1	104.1	68.6

Table (6)

Consumer price index for the poor

	Expen-diture percent-age	July 2009 to July 2011 Inflation rate (%)	July 2011 to July 2013	July 2013 to Dec 2015	Dec 2015 to July 2017
Total infla-tion	**100%**	**34.079**	**21.247**	**28.731**	42.527
Food		28.27	16.48	18.9	33.9
67%					
Education				4.38	1.54
10%		2.624	2.191		

Clothing					
3%		0.744	0.321	0.474	1.068
Housing & maintenance					
13%		1.3	1.625	3.003	2.925
Healthcare		0.248	0.381	0.744	1.383
3.00%					
Transporta-tion		0.893	0.249	1.23	1.711
4.00%					

- Food inflation in this index is similar to that in the consumer price index for the hungry
- Inflation rate for this interval was calculated based on the fact that the standard number for all expenditure items was equal to the general standard number, which is 93.7 for July 2009 for base year January 2010
- Inflation in this item is calculated based on 50% of expenditure multiplied by the official inflation rate in the item while the remaining 50% are multiplied by the rise percentage in electricity, gas, and water bills with an average increase of 33.5%)