Assignment #2 – Estimating the Economic Impact on Households from Pneumonia in Bangladesh

**General instructions**

In this assignment, you will evaluate the impact childhood illness has on families in Bangladesh in terms of catastrophic health expenditures using the cost of pneumonia or diarrhea estimates you generated in Assignment 1.

1. You will first
   1. **assess the living standards for each case before the child's illness**,
      1. including estimating the annually and monthly household consumption and the poverty headcount.
2. Then, using cost of pneumonia estimates calculated in the Assignment 1, you will **calculate the catastrophic expenditure headcount and overshoot.**

For this assignment, you will use the same dataset you chose for Assignment 1**.**

# Household Consumption and Poverty

## Complete the table of average household and per capita consumption of the sample

In this question, you will explore the living standards of the study sample before the pneumonia or diarrhea illness. The household consumption including food and non-food expenses can be calculated monthly or annually, but for this assignment we will use monthly household consumption.

**The variables for the monthly total household consumption *[exp\_monthly]*, food consumption *[exp\_food]*, and non-food consumption *[exp\_monthly\_nf]* are already in the dataset**. Complete the table by:

1. **Create a new variable called *exp\_monthly\_pc*** to calculate the per capita monthly household consumption
   1. by **dividing the total household expenses including food and non-food expenses *[exp\_monthly]***
   2. by **the household size including the sick child**.
      1. *Note: The household size variable in the dataset [hhsize] excludes the sick child.*
2. Repeat step 1 to create new variables for **per capita monthly food *[exp\_food\_pc]***and **non-food *[exp\_monthly\_nf\_pc]***expenses.
3. **Calculate the overall average household consumption and per capita consumption for each variable**.
4. **Calculate the percentage of the total household consumption that is for food and for non-food expenses in the table**.
5. Complete Table 1 describing the household and per capita consumption for the study sample before the pneumonia illness. **Report the average amount and in parentheses add the % of total consumption for food and non-food consumption.**

**Table 1.** **Average monthly household consumption of the sample before the pneumonia illness**

|  |  |  |
| --- | --- | --- |
|  | **Household Consumption**  Average (% of total) | **Per Capita Consumption**  Average (% of total) |
| *Food Consumption* |  |  |
| *Non-food Consumption* |  |  |
| *Total Consumption* |  |  |

Using the pre-calculated wealth quintiles *[quintile\_asset]* that follow the national distribution, we can look at the distribution in per capita consumption by wealth quintile.

Complete the table below by calculating the average **monthly per capita consumption** by wealth quintile.

**Table 2.** **Average monthly per capita consumption by wealth quintile**

|  |  |  |  |
| --- | --- | --- | --- |
| **Wealth Quintile** | **Food Consumption** | **Non-Food Consumption** | **Total Consumption** |
| *Quintile 1 (Poorest)* |  |  |  |
| *Quintile 2* |  |  |  |
| *Quintile 3* |  |  |  |
| *Quintile 4* |  |  |  |
| *Quintile 5 (Wealthiest)* |  |  |  |

## 1.2 Calculate the poverty headcount and poverty gap for the study sample before the pneumonia illness

In addition to household consumption, living standards can also be assessed using the poverty headcount and poverty gap. In Bangladesh, the national per capita poverty line in 2018 was **BDT 1862 (USD 24.91)** monthly[[1]](#footnote-1). In this question, you will **estimate the poverty headcount and poverty gap using the per capita household consumption variable *[exp\_monthly\_pc]*** you generated in question 1.1.

1. Create a new variable to denote **whether the household in which the child lives is below the poverty line *[poverty\_status]*. Set the variable equal to 1 if the household is below the poverty line and 0 if it is equal to or above the poverty line**.
2. Using the *poverty\_status* variable and the poverty line, **calculate the poverty headcount** using the formula below.
3. Using the *poverty\_status* variable and the poverty line, **calculate the poverty gap** using the formula below.

|  |  |
| --- | --- |
| Poverty Headcount index (incidence), α = 0:  Poverty gap (poverty depth), α = 1: | k = Number of poor people  N = Total Population  z = Poverty Line  yi = Consumption of individual *i*  *α =* Parameter showing the degree of aversion to inequality among the poor |

|  |  |  |
| --- | --- | --- |
|  | **Study Sample** | **National (2018)** |
| Poverty Headcount (% living below the poverty line) |  | 21.8% |
|  |  |  |
| Poverty Gap (average % from the poverty line) |  | 5.0% |

## Describe your findings

*You can talk about:*

1. *How does the average per capita food and non-food consumption vary across wealth quintiles?*
2. *How does the proportion of monthly consumption spent on food vs. non-food differ across wealth quintiles?*
3. *Considering consumption and poverty, how does the study sample living standards compare to the rest of the country?*

|  |
| --- |
|  |

# Catastrophic health expenditure

A healthcare expense is considered "catastrophic" if it exceeds a fixed percentage of the household resources. In this section, you will estimate the catastrophic payment headcount for the study sample using the two approaches described in the lecture:

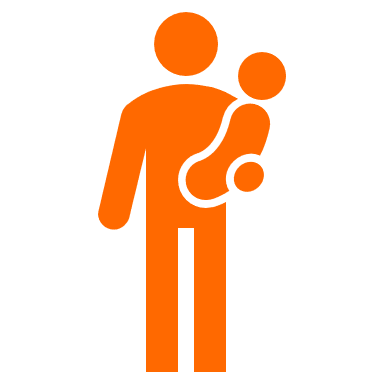
|  |  |  |  |
| --- | --- | --- | --- |
| **Approach 1 – Total Household Consumption** | | **Approach 2 – Capacity to Pay** *(Non-Food Consumption)* | |
|  | T = Out-of-pocket health payment  x = Total Consumption  Threshold = 10% |  | T = Out-of-pocket health payment  x = Total Consumption  f(x) = Food Expenditure  Threshold = 40% |

Use the estimates of the out-of-pocket cost of pneumonia or diarrhea calculated in Assignment 1. As a reminder, the out-of-pocket cost is a only a portion of the total societal cost of the illness. It includes the following household costs:

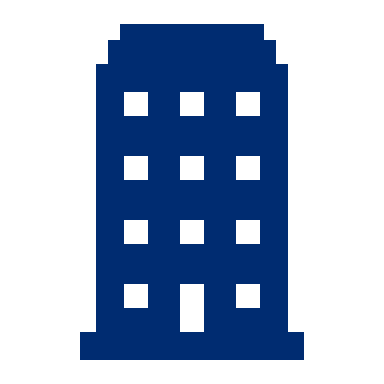
*Medical costs before & after*

*Non-medical costs*

*Indirect costs*



*Service costs*



* Transportation costs
* Meal costs
* Other non-medical costs

Current visit only:

* **Consultation fee**
* **Investigation charges**
* **Medications costs**
* **Bed stay fee**

***Medical costs at current visit***

Before and after current visit:

* Consultation fee
* Investigation charges
* Medications costs
* Bed stay fee

Instructions: Copy the average household direct medical, non-medical, and total out-of-pocket costs from Assignment 1.

**Table 3. Average Household Out-of-Pocket Costs for inpatient and outpatients by facility type**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type of Household Cost** | **Public Health Facilities** | | **Private Health Facilities** | | |
| *Inpatient care* | *Outpatient care* | *Inpatient care* | *Outpatient care* |
| Total direct medical cost |  |  |  |  |
| Total direct non-medical cost |  |  |  |  |
| **Total household out-of-pocket cost** |  |  |  |  |

## Calculate catastrophic payment headcount using monthly consumption

In this question, you will assess the household impact of the illness by estimating the proportion of cases whose out-of-pocket expense is considered catastrophic. The catastrophic payment headcount can be calculated using the formula:

Using the variables for the total out-of-pocket cost (generated in Assignment 1) and the monthly total household consumption *[exp\_monthly]* and non-food consumption *[exp\_monthly\_nf],* calculate the catastrophic headcount using both approaches. Then complete Table 4 for different visit types and sectors.

**Table 4.** **Catastrophic health expenditure headcount using each approach**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sector** | **Visit Type** | **Catastrophic Headcount using Approach 1** | **Catastrophic Headcount using Approach 2** |
| Public | Inpatient |  |  |
| Outpatient |  |  |
| Private | Inpatient |  |  |
| Outpatient |  |  |
| Overall | Inpatient |  |  |
| Outpatient |  |  |

## Calculate catastrophic payment overshoot using monthly consumption

The catastrophic payment overshoot indicates the average severity of the catastrophe by measuring the average gap between the out-of-pocket health payment and the threshold. The overshoot can be calculated using the formula:

**Using the same variables for the total out-of-pocket cost and the monthly total household consumption *[exp\_monthly]* and non-food consumption *[exp\_monthly\_nf]****,* calculate the catastrophic overshoot using both approaches. Then complete Table 5 for different visit types and sectors.

**Table 5.** **Catastrophic health expenditure overshoot using each approach**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sector** | **Visit Type** | **Catastrophic Overshoot using Approach 1** | **Catastrophic Overshoot using Approach 2** |
| Public | Inpatient |  |  |
| Outpatient |  |  |
| Private | Inpatient |  |  |
| Outpatient |  |  |
| Overall | Inpatient |  |  |
| Outpatient |  |  |

## Describe the findings

*You can talk about:*

1. *How are the estimates of catastrophic health expenditures different for two approaches?*
2. *Which type of health sector and type of illness had the highest headcount? Is this what you would expect and why?*
3. *Which type of health sector and type of illness had the highest overshoot? Is this what you would expect and why?*
4. *In your opinion, which approach would you recommend using and sharing with policymakers?*

|  |
| --- |
|  |

# Distributional Impact

Using the pre-calculated wealth quintiles *[quintile\_asset]*, we can look at the distributional impact the illness has on households. In this section you will calculate the average out-of-pocket payment and catastrophic health expenditures for each quintile.

## Calculate differences in payment source by wealth quintile

We can also look at how households paid for the illness episode. The distribution of payment sources can indicate the impact on households. Households that have savings can cope with the unexpected health expense better than households that have to use current wages or sell assets.

**Using the payment source *[moneysource]* and wealth quintile *[quintile\_asset]* variables, create a bar graph showing the proportion of households that borrowed money or sold assets vs. used savings by wealth quintile.**

## Calculate differences in out-of-pocket health spending by wealth quintile

**Using the out-of-pocket variable created in Assignment 1 and the wealth quintile variable *[quintile\_asset]*, calculate the average household out-of-pocket cost for inpatients and outpatients by wealth quintile. Then copy the results in the Table 6.**

**Table 6.** **Average Household Out-of-Pocket costs for inpatient and outpatients by wealth quintile**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wealth Quintiles** | **Public Health Facilities** | | **Private Health Facilities** | |
| *Inpatient care* | *Outpatient care* | *Inpatient care* | *Outpatient care* |
| Quintile 1 (Poorest) |  |  |  |  |
| Quintile 2 |  |  |  |  |
| Quintile 3 |  |  |  |  |
| Quintile 4 |  |  |  |  |
| Quintile 5 (Wealthiest) |  |  |  |  |
| Total |  |  |  |  |

## Calculate catastrophic payment headcount and overshoot using monthly consumption by wealth quintile

**Using the variables created in questions 2.1 and 2.2 and the wealth quintile variable *[quintile\_asset]*, calculate the catastrophic headcount for inpatients and outpatients by wealth quintile. Then copy the results in the Table 7.**

**Table 7. Catastrophic health expenditures among inpatients and outpatients by sector and quintile**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Wealth Quintiles** | **Public Health Facilities** | | **Private Health Facilities** | |
| *Inpatient care* | *Outpatient care* | *Inpatient care* | *Outpatient care* |
| Quintile 1 (Poorest) |  |  |  |  |
| Quintile 2 |  |  |  |  |
| Quintile 3 |  |  |  |  |
| Quintile 4 |  |  |  |  |
| Quintile 5 (Wealthiest) |  |  |  |  |
| Total |  |  |  |  |

## Describe the findings

*You can talk about:*

1. *How are the estimates of out-of-pocket health spending different across the wealth quintiles? What are some possible reasons for these differences?*
2. *How are the estimates of catastrophic health expenditures different across the wealth quintiles? What are some possible reasons for these differences?*
3. *What do these results, including the out-of-pocket payments, catastrophic health expenditures, and sources of health financing, say about the healthcare equity in this population?*
4. *In your opinion, what are some ways these results can be used in policy making?*

|  |
| --- |
|  |

# Medical Impoverishment

In addition to measuring the catastrophic headcount and overshoot, we can also assess the household impact by estimating the proportion of households that fall into poverty after the out-of-pocket expense. In this question, you will estimate the poverty headcount and gap ***after*** the out-of-pocket healthcare payment. Complete the table by:

1. **Create a new variable called *oop\_expense\_pc***to calculate the out-of-pocket expense per capita by dividing the out-of-pocket expense by the household size including the sick child. ***Note:* The household size variable in the dataset *[hhsize]* excludes the sick child.**
2. **Create a new variable called *net\_exp\_monthly\_pc*** to calculate the per capita household consumption minus the out-of-pocket payment using the variables *exp\_monthly\_pc* and *oop\_expense\_pc.* **Then calculate the average per capita household consumption post-payment by wealth quintile.**
3. **Create a new variable to denote whether the household is below poverty line after the out-of-pocket payment *[post\_poverty\_status]*.** Set the variable equal to 1 if the household is below the poverty line and 0 if it is equal to or above the poverty line.
4. **Using the *post*\_*poverty\_status* variable** and the poverty line, calculate the poverty **headcount** post-payment by wealth quintile using the formula from question 1.2.
5. **Using the *post\_poverty\_status***variable and the poverty line, calculate the poverty **gap** post-payment by wealth quintile using the formula from question 1.2.
6. Complete Table 8 describing the change in poverty variables post-payment.

**Table 8.** **Change in poverty variables after the out-of-pocket expense by wealth quintile**

|  |  |  |  |
| --- | --- | --- | --- |
| **Wealth Quintiles** | **Average Household Consumption per capita** | **Poverty Headcount** | **Poverty Gap** |
| Quintile 1 (Poorest) |  |  |  |
| Quintile 2 |  |  |  |
| Quintile 3 |  |  |  |
| Quintile 4 |  |  |  |
| Quintile 5 (Wealthiest) |  |  |  |
| **Total** |  |  |  |

## Describe the findings

*You can talk about:*

1. *How does the average per capita household consumption after the out-of-pocket payment compare to before the payment (Table 2)? Is the change in average consumption the same across all wealth quintiles?*
2. *How many households fell into poverty following the out-of-pocket payment? Is the medical impoverishment impact the same across wealth quintiles?*
3. *How did the poverty gap change pre- and post- out-of-pocket payment? How does the change vary across wealth quintiles?*
4. *In your opinion, what are some ways these results can be used in policy making?*

|  |
| --- |
|  |

1. Preliminary Report on Household Income and Expenditure Survey (HIES) 2016. Bangladesh Bureau of Statistics. 2017. Available from: <http://microdata.worldbank.org/index.php/catalog/2986/download/41608> [↑](#footnote-ref-1)