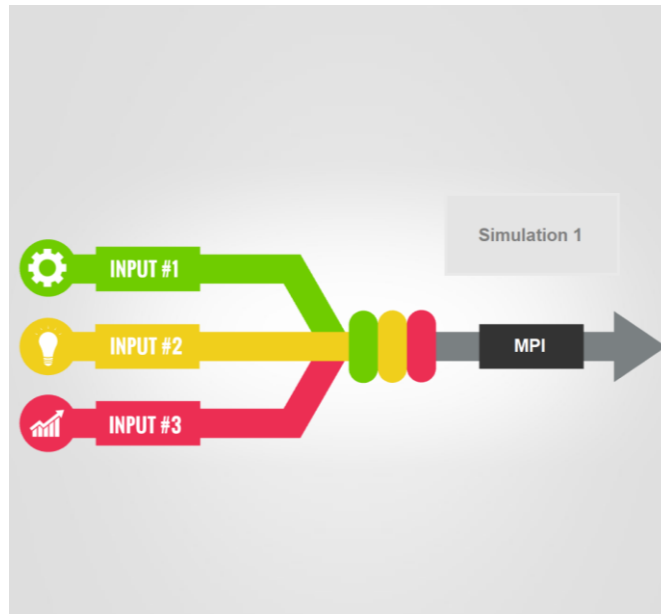# Simulating MPI

UNITED NATIONS

ESCWA

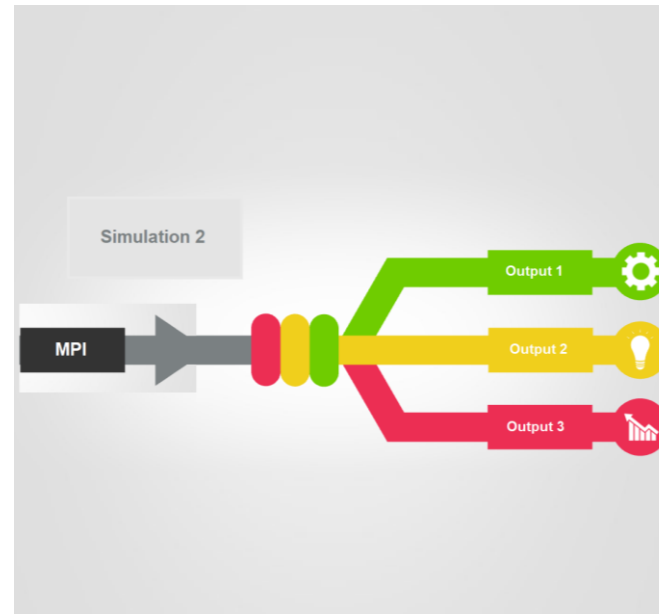Shared Prosperity **Dignified Life**

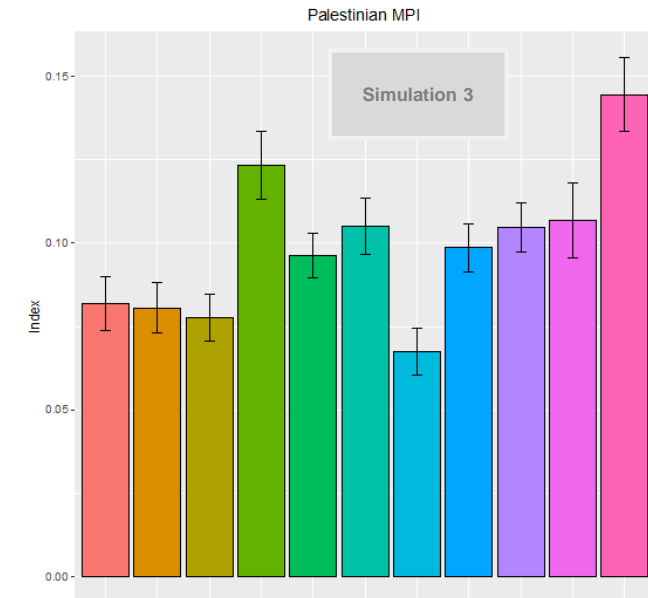# 3+ Simulation Types

Simulation 1

◦ Apply a positive/negative shock on the raw microdata

◦ Compute the MPI after shock
(Lebanon Case)

Simulation 2

◦ Decide on the MPI reduction target

◦ Optimization identifies the best intervention channels and levels
(Lebanon & Tunisia Cases)

Palestinian MPI

Simulation 3

◦ Relate the aggregate MPI change to macroeconomic changes
(Iraq & Palestine Cases)

Simulation 1 – Nowcasting Data
The Case of Lebanon

○ Methodological Concept

- ◦ This tool can be used to predict the effect of social policies, which constitute a positive shock, as well as the effects of negative shocks such as the COVID-19 pandemic, on MDP
- ◦ The exercise is based on the Monte Carlo method. This is because the shocks are (generally) not deterministic: even though we can estimate the total intensity of the shock (percentage of people attained), we cannot determine the exact concerned people. We thus resort to randomness to study the 'average' behavior of this shock.

○ Background Computations

- ◦ We present two models:
  - ◦ The first is a bit simplistic, offering only a uniform shock (completely random) on the set of concerned households.
  - ◦ The second model can be qualified as more realistic, generalizing the first model, as it targets the shock according to deprivation scores.

Proposed Framework

Using the latest Labor Force and Household Living Conditions Survey (LFHLCS, 2019) for Lebanon, population-representative at the governorate level, we developed a framework (FW) to measure the Multidimensional Poverty Index (MPI) at both the national and subnational levels.

Education	Health	General services	Housing	Assets	Employment and income
Access to education	Health insurance	Electricity	Overcrowding rate	Internet access & Information, communications and technology	Unemployment
Educational attainment	Access to medicines	Drinking water	Housing type	Means of transport	Employment informality
School attendance	Access to medical services	Sanitation	Having a toilet	Household electrical devices	Income
		Waste collection		Heating devices	

Note: The weights are equal between and within dimensions.

Impoverishment in details

Dimension (weight)	Indicator (weight)	Shock	Deprived If
Education (weight=16.67%)	**LF01 Access to Education** (weight=33.33%)		HH is deprived if there is no school public, private, elementary, complementary and secondary) within a 10 minutes walk distance
	LF02 – Educational Attainment (weight=33.33%)		HH is deprived if all members aged 20+ are either: Not enrolled, Illiterate, Read and write, Pre-school, Elementary, Intermediary
	LF03 – School Attendance (weight=33.33%)	✸	HH is deprived if any member aged 5-19 is not attending school (excluding members who completed secondary)
Health (weight=16.67%)	**LF04 – Health Insurance** (weight=33.33%)		HH deprived if any HH member has no health insurance coverage (excluding domestic workers - no data)
	LF05 – Access to Medicines (weight=33.33%)	✸	HH deprived if any HH member needs regular medication and can't afford it (excluding domestic workers - no data)
	LF06 – Access to Medical Services (weight=33.33%)	✸	HH deprived if any HH member needs medical services and can't afford it (excluding domestic workers - no data)
General Services (weight=16.67%)	**LF07 – Electricity** (weight=25%)	✸	Deprived if HH has no access to electricity or a generator
	LF08 – Drinking Water (weight=25%)		Deprived if HH uses non-improved drinking water or HH uses bottled water and not improved service water
	LF09– Sanitation (weight=25%)		HH is deprived if there is no access to improved drainage technique
	LF10 – Waste Collection (weight=25%)	✸	HH is deprived if garbage is not disposed in containers or disposed of in containers inside the building which are emptied once a week or less
Housing (weight=16.67%)	**LF11 – Overcrowding rate** (weight=33.33%)		HH is deprived if there are more than 2 persons aged 10+ per room
	LF12 – Housing type (weight=33.33%)		Deprived if the housing situation fits at least one of the following conditions: (i) home is a place other than a stand-alone house or apartment ; (ii) area is less than 30m2 ; (iii) it has a non-permanent floor
	LF13 – Having a toilet (weight=33.33%)		HH is deprived if HH has no toilet in dwelling
Assets and Property (weight=16.67%)	**LF14 – Internet Access and ICT** (weight=25%)	✸	HH is deprived if it has no internet access and has neither a phone (fixed phone or cell phone), computer, iPad, TV, DVD, satellite dish
	LF15 – Means of transport (weight=25%)	✸	HH is deprived if it has neither a car nor a motorcycle and do not have access to public transportation (<10min)
	LF16 – Household electrical devices (reduced list) (weight=25%)	✸	HH is deprived if it has neither a fridge, washing machine, air conditioner nor any water heater
	LF17 – Heating devices (weight=25%)	✸	HH deprived if it has no heating other than charcoal
Employment and Income (weight=16.67%)	**LF18– Unemployment (ANY)** (weight=33.33%)	✸	HH deprived if all HH members, aged 20+, are unemployed or underutilized or discouraged
	LF19 Employment Informality (ALL) (weight=33.33%)		HH deprived if all HH member, aged 20+, are informally employed
	LF20 – Income (2019) (weight=33.33%)	✸	HH is deprived if adjusted income for children and economies of scale is less than 386,000 LBP

Indicator	Negative Shock Magnitude (additional increase)		Source and date of latest estimation
	Lebanese	Non Lebanese	
School Attendance (among Vulnerable HHs)	15%	35%	Unicef, June 2021
Access to Medication	47%	57%	WFP, June 2020
Access to Medical Services	27%	32%	WFP, June 2020
Internet Access and ICT	8.39%	9.155%	2021 (WFP Report June 2020 + 1SD)
Means of Transport	5.7%	6.375%	2021 (WFP Report June 2020 + 1SD)
Domestic Livelihood Assets / Household Electrical Devices	6.83%	10.08%	2021 (WFP Report June 2020 + 1SD)
Heating Assets/Devices	8.72%	11.97%	2021 (WFP Report June 2020 + 1SD)
Unemployment	1.1%		ILO, May 2020
Electricity	45%		Imagery analysis, Aug 2021
Waste Collection	33%		News reports, Aug 2021
Income	Increase the 2019 poverty line to the CPI-adjusted poverty line		CAS

Negative Shock Simulation

- Monte Carlo Simulation

- Multiple negative shocks

- Uniform shock across deprivation levels

- Number of iteration, run-time and stabilization

- HHs, or individuals, are targeted based on the characteristics of target population in the latest data source (i.e. the updated surveys).
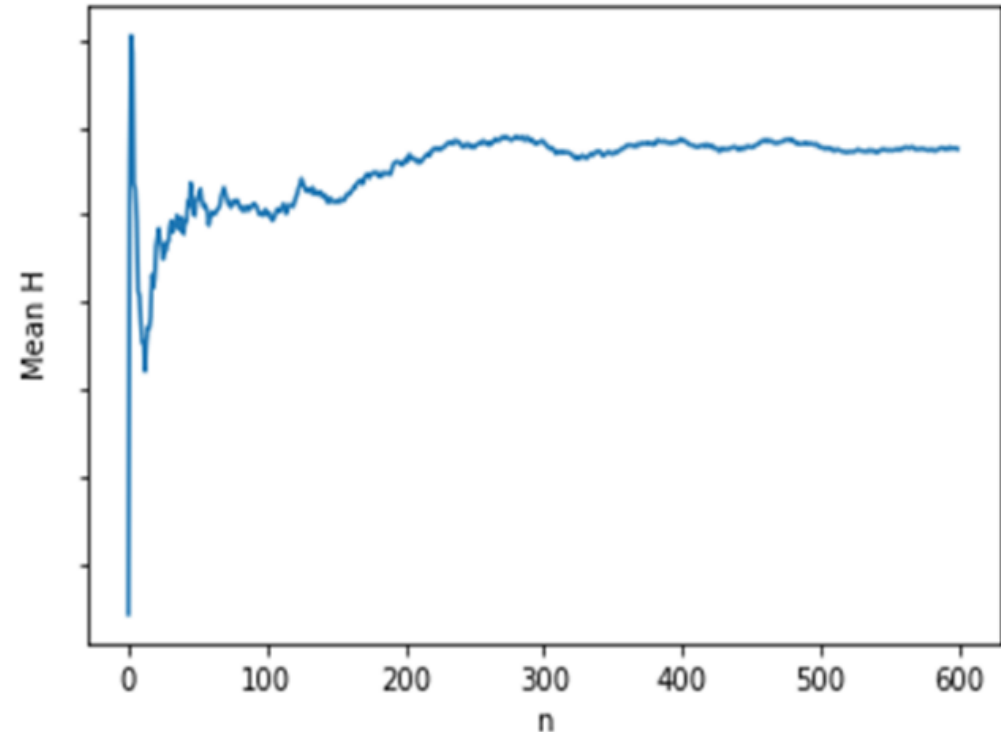
Impoverishments between 2019 to 2021

The latest survey at hand is for the year 2019, and the aim of this study is not only to compute the MPI for the base year, but also to forecast poverty measures going forward, more specifically to year 2021.

The base case is to randomly shock each indicator, by transforming the status of the non-deprived into deprived, in selected indicators.

The magnitude of the shock is based on evidence from quick assessment surveys or on other objective metrics from specialized sources.

Changes in Multidimensional Poverty Headcounts Between 2019 and 2021

Year	Extreme Poor	Poor	Non-poor
2019	8	32	60
2021	34	48	18

Legend: ■ Extreme Poor ■ Poor ■ Non-poor
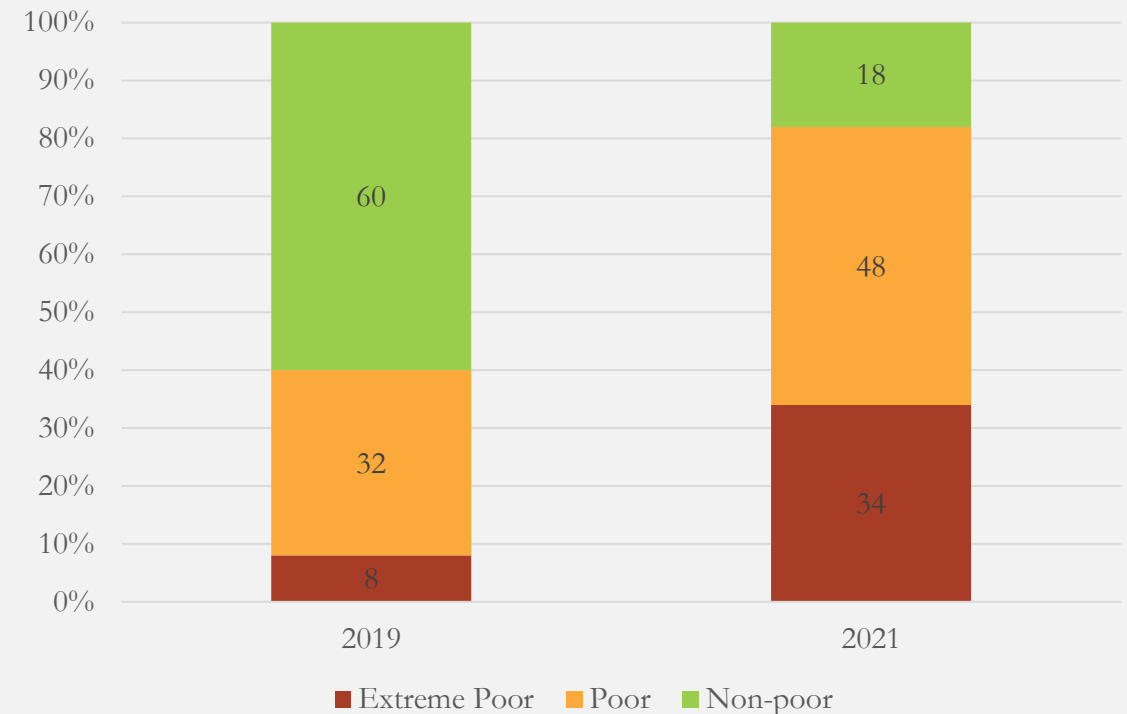
Deprivation Scores Distributions

2019 vs 2021

2019-2020 comparative

	MPI	Average Intensity (A)	Poverty headcount (H)
2020	0.23	0.3	0.73
2019	0.11	0.27	0.41

Dimensions Contributions
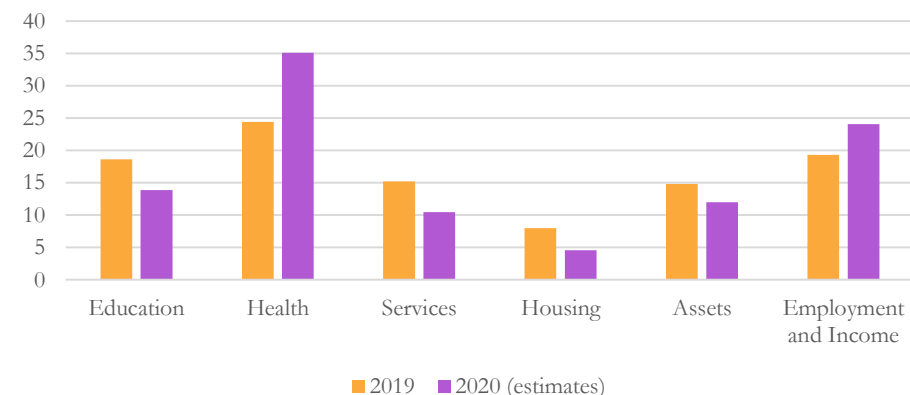
Simulation 3 – The Cases of Iraq, Palestine

- Dimensions/indicators of a multidimensional poverty index (MPI) should be modeled separately, with differentiated trends & impacts on MPI
- Deprivations in dimensions/indicators are linked by a joint-distribution function reflecting complementarities and overlaps
- The aim is to produce a realistic profile of development amid shocks

- The method helps States forecast multidimensional poverty under various scenarios for developmental shocks
- & help them formulate measures addressing the projected gaps

To apply the method, use:

- MPI framework & household survey microdata to estimate the joint distribution function of deprivations
- Aggregate trends from 2+ harmonized surveys & macroeconomic changes to estimate the effects of the shocks on the joint distribution function
  - Palestinian Expenditure & Consumption Surveys 2011, 2016; or Iraqi Multiple Indicator Cluster Surveys 2011, 2018
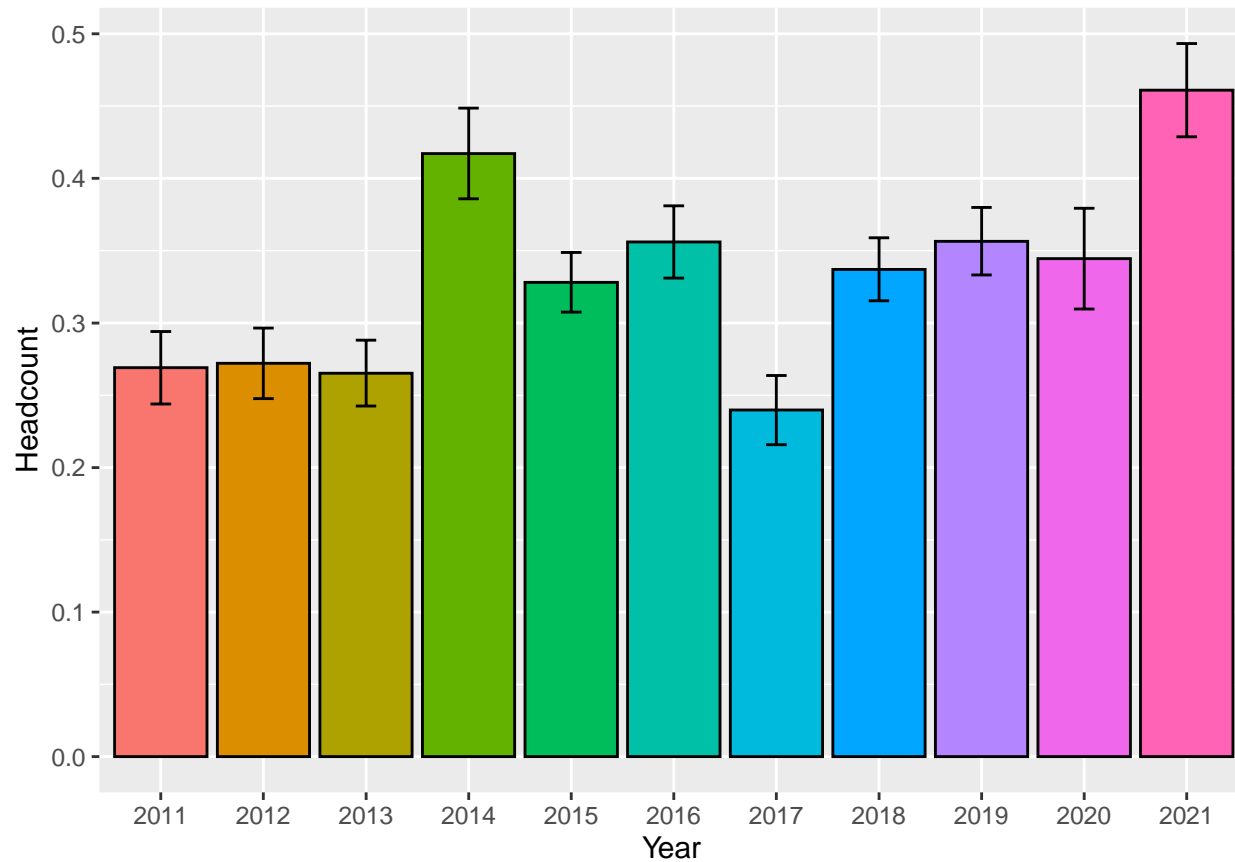
The results show that:

- The model reproduces the MPI values accurately in both years – despite the 5-7 year window
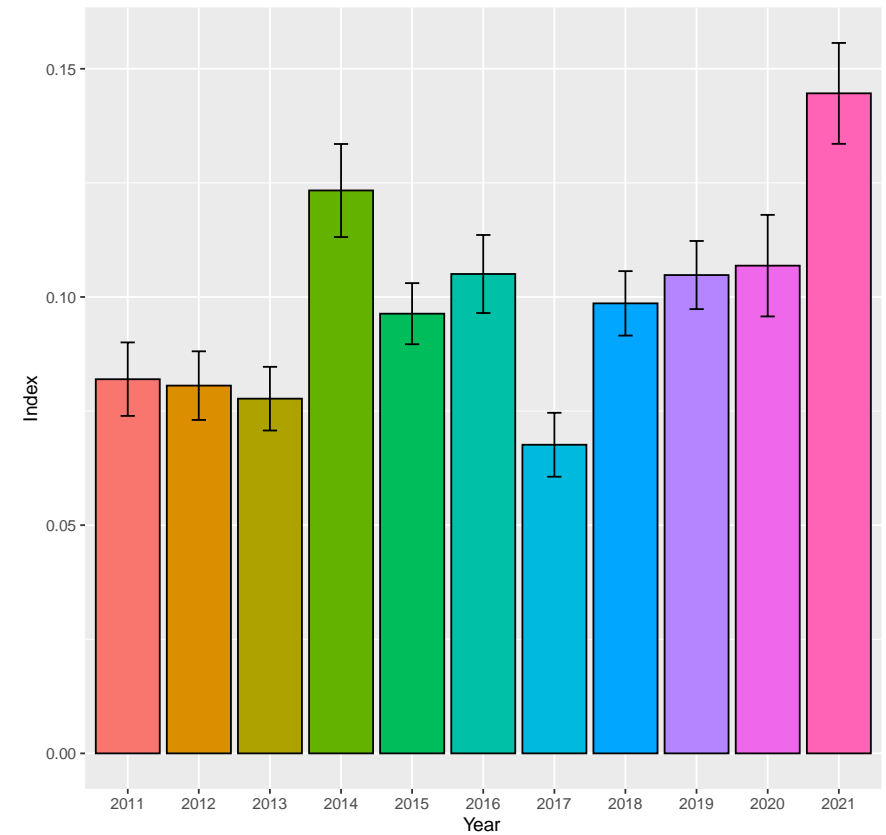- COVID-19 pandemic has set human development back by some 7 years.

Iraq
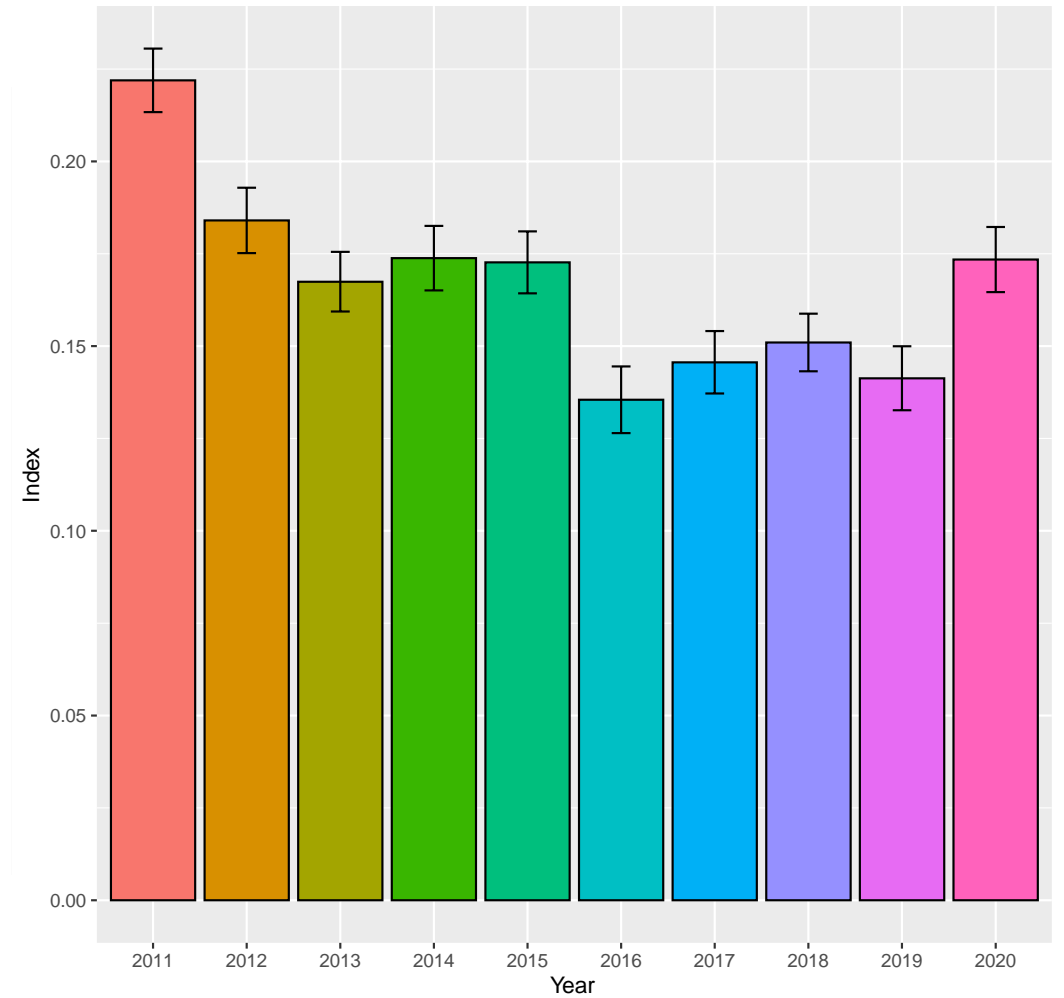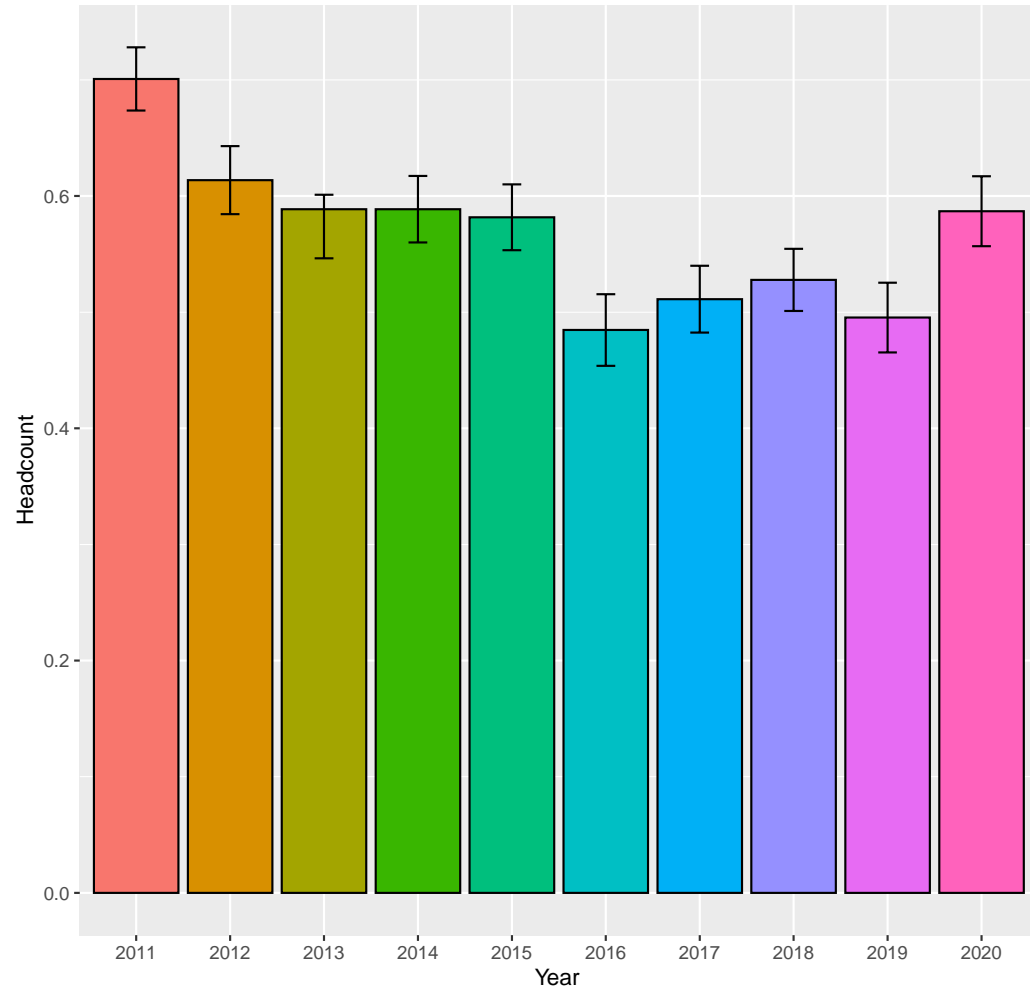
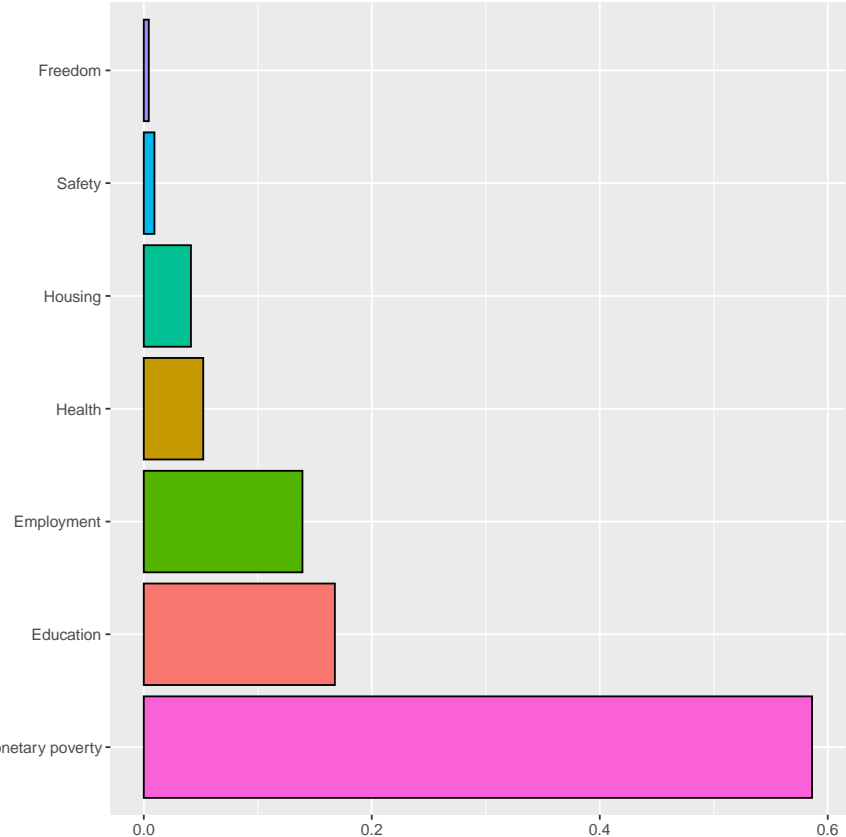# Palestine

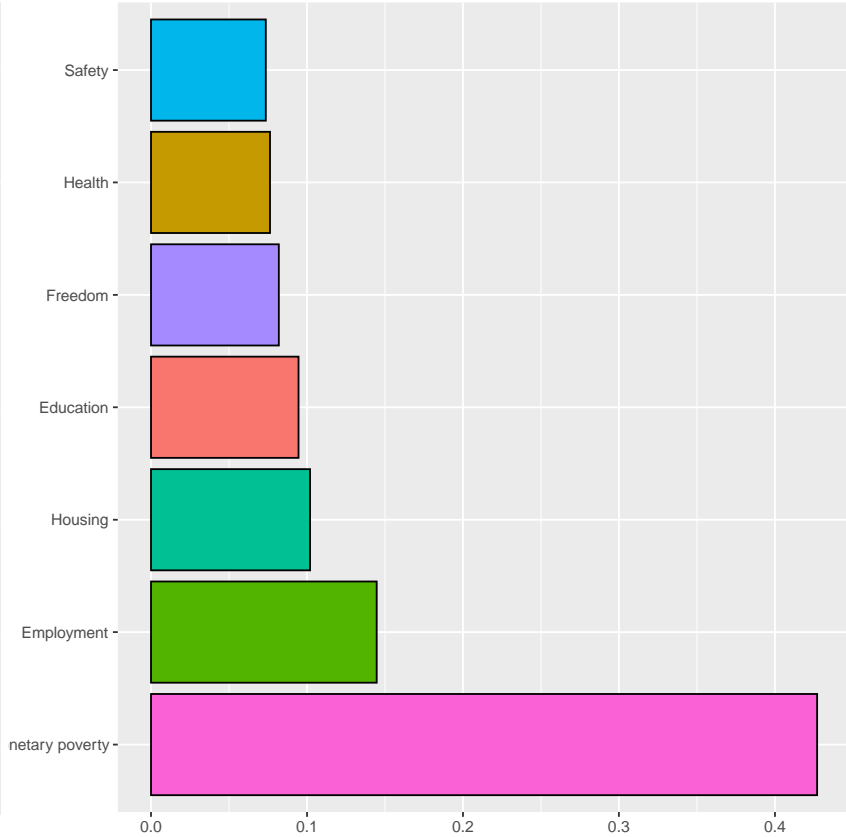Incidence of multidimensional poverty in Palestine
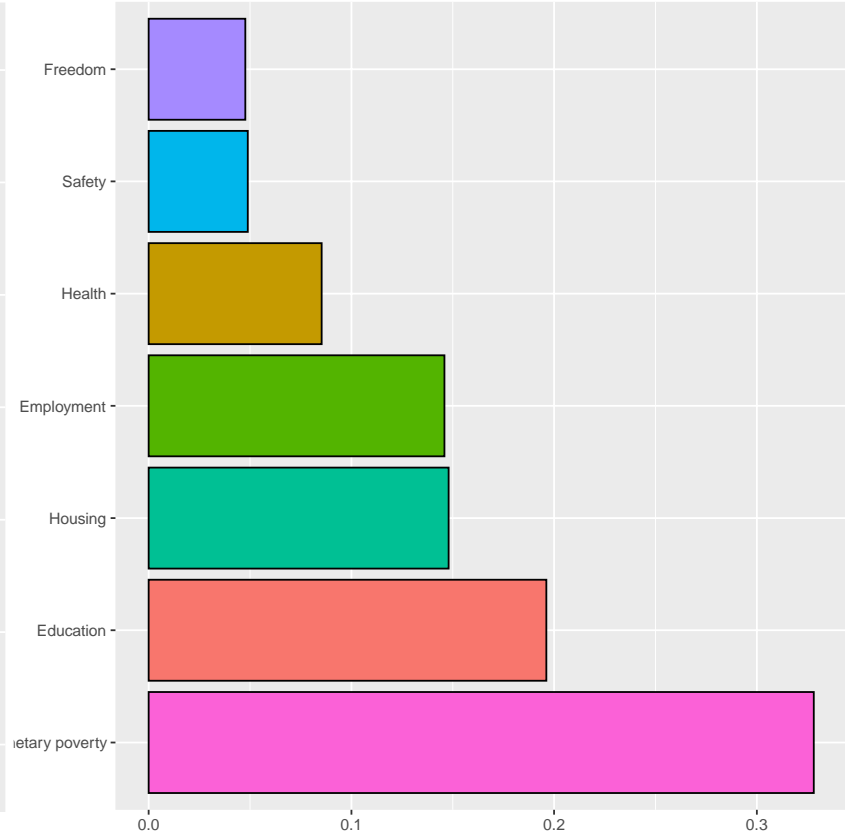
Palestinian MPI

Palestine
Contribution of Indicators

Contribution of each indicator in 2011 — Contribution of each indicator in 2016 — Contribution of each indicator in 2021

Thank you