



Estimates and forecasts of extreme poverty by sex and age using the International Futures Model

By UN Women, UNDP and the Frederick S. Pardee Center for International Futures¹

Key findings²

The COVID-19 pandemic risks reversing decades of progress in the eradication of extreme poverty.

- The global economy is expected to contract by 5 per cent in 2020³ and unless measures are taken to shield the most vulnerable, by 2021 the number of women, men and children living in extreme poverty – that is, on less than USD \$1.90 a day – is projected to swell by 96 million relative to a world in which the pandemic never occurred.⁴
- In 2021, based on a sample of 129 countries and areas accounting for 89 per cent of the global population, some 435 million women and girls globally (or 13 per cent of the female population) will be struggling to survive on less than \$1.90 a day, including 47 million that will be pushed into extreme monetary poverty by COVID-19. The corresponding figure for men and boys is 430 million (or 12 per cent of the male population).⁵
- Unless measures are taken, a decade will be lost in the fight against extreme poverty. The total number of women and girls living in extreme poverty is forecast to total 409 million in 2020 (up from 398.5 million in 2019), peak at 435 million in 2021, and will not revert to pre-pandemic levels until the year 2030 (see Table 1 in Annex 2).⁶

The fallout of the pandemic will shift forecasts of extreme poverty across regions.

- Central and Southern Asia and sub-Saharan Africa (where 87 per cent of the world's extreme poor live) will see the largest increases in extreme poverty, with an additional 54 million and 24 million people, respectively, living below the international poverty line as a result of the pandemic.⁷
- In sub-Saharan Africa, pre-COVID 19, the female poverty rate was projected to reach 42.3 per cent in 2021. The projection is now 44.5 per cent. Between 2021 and 2030, the number of women and girls living in extremely poor households in this region is expected to increase from 249 to 283 million. By 2030, 71 per cent of women and girls living in extreme poverty will reside in sub-Saharan Africa.⁸
- Central and Southern Asia, and particularly the sub-region of South Asia, has made significant progress in reducing extreme poverty in the past few years. However, the economic fallout of the pandemic is projected to bring with it a resurgence in extreme poverty. The female poverty rate,

pre-COVID-19, was projected to be 10 per cent in 2021, but the figure is now projected to reach 13 per cent. Before the pandemic, projections for the region suggested that by 2030 it would comprise only 15.8 per cent of the world's women and girls living in extreme poverty. The revised projections now put that figure at 18.6 per cent.

Gender gaps in extreme poverty, already biased against women, will worsen as a result of the crisis.

- Children account for nearly half of the world's extreme poor⁹. Their poverty rates are projected to rise in 2020 and 2021. In 2020, one in five girls aged 0–14 are projected to live in extreme poverty, and the figure will rise to 21 per cent in 2021. The corresponding figure for boys is 19 per cent in 2020 and 20 per cent in 2021. Pre-pandemic, it was estimated that extreme poverty rates among boys and girls would fall to 16 per cent globally by 2030. The figure is now 2 percentage points higher, as new forecasts indicate 18 per cent of children 0–14 will live in extreme poverty in 2030.¹⁰
- Globally, the largest gaps between women and men are observed in the ages of 25–34. In 2021, there will be 118¹¹ women for every 100 men aged 25–34 living in extreme poverty, a ratio that is expected to increase to 121 women per 100 men by 2030. These disparities in rates of extreme poverty coincide with a period in women's lives when they are most likely to bear the bulk of unpaid care and domestic work related to caring for young children and other dependents.
- The trajectories of gender poverty gaps vary at the regional level. In sub-Saharan Africa, between 2021 and 2030, there will continue to be around 116 women in extreme poverty for every 100 men aged 25–34. However, in Central and Southern Asia, this ratio will rise from 117 to 127 extremely poor women for every 100 men. In Southern Asia alone, this ratio is expected to increase from 118 to 129 women for every 100 men living in extreme poverty, during this same period.¹²
- A female poverty disadvantage in the 25–34 age cohort currently exists in 75 of 117 low- and middle-income countries. Only eight of these countries are expected to close this gender gap by 2030. Unless accelerated policy action is taken, the remaining 67 countries will continue to have gender poverty gaps for this age group way beyond even 2050.
- Among those aged 55 and over, women make up the majority of those living in extreme poverty (53 per cent). The 2021 projections indicate that 38 million women aged 55+ globally will be living in extreme poverty compared to 34 million men. Women have a higher life expectancy than men and therefore comprise a greater share of those aged 55+. Their proportion among the extreme poor aged 55+ is projected to remain unchanged in 2030.

Smart investments and sound policies are crucial to put the world back on-track to eradicate extreme poverty.

A policy simulation analysis emanating from the International Futures Model estimates that over 100 million women and girls could be lifted out of poverty if governments were to invest in a comprehensive strategy aimed at improving access to education and family planning, fair and equal wages, and expanding social transfers.

The cumulative cost¹³ of lifting the world out of extreme poverty by 2030 is estimated at about USD 2 trillion in purchasing power parity (PPP) terms, or 0.14 per cent of global GDP. Three in every four dollars needed to eradicate extreme poverty by 2030 must be invested in sub-Saharan Africa, where the majority

of the extreme poor reside, and 1 in every 10 dollars in Central and Southern Asia.¹⁴ Moreover, given that more women than men live in poverty, part of eradicating extreme poverty will mean accelerating poverty reduction among women such that they no longer experience a disadvantage in exposure to extreme poverty relative to men. Investments targeted at closing this gap are estimated to total USD 48 billion in PPP.

Notes on methodology

The findings presented in this technical note and accompanying spreadsheet include extreme poverty rates and ratios by sex (male, female) for all ages, 15+, 15–24, 25–34, 35–54 and 55+ at the country, regional and global level for years 2019 (pre-COVID-19) and 2020, 2021, 2022, 2030 and 2050 (COVID-19-adjusted). Country classifications by SDG regional groupings and Least Developed Country (LDC), Landlocked Developing Country (LLDC) and Small Island Development State (SIDS) status are also provided. Updates to this dataset will be released as more information becomes available and the data are further refined. This current August 2020 release includes estimates marked as *beta*, which may be revised in subsequent months. This section briefly discusses the methodology for the various indicators presented and the key assumptions of the International Futures model.

An important caveat to this analysis is that these estimates are based on household-level data. Individual-level data on extreme poverty are not available. Therefore, the estimates presented above likely underestimate the magnitude of the intersections between extreme poverty and gender, since intra-household inequality in control and access to income are not captured or accounted for. An untold number of women living in non-poor households have no or limited access to their own income and have no say on how household resources may be used or spent. They are *de facto* income poor and likely to face many other well-being deprivations, yet remain uncaptured and invisible, even in this new analysis.

Extreme poverty (living on less than USD \$1.90 a day) headcounts by sex and age

Extreme poverty rates at the global, regional and country level are available in the [UN SDG Global Indicators database for 91 countries](#). However, the gender poverty gaps by age are only [available at the global and regional level](#) through a UN Women and World Bank collaboration. Additionally, information at the country level is available for an even smaller sub-sample of [30 countries](#) from South Asia and sub-Saharan Africa only. Using these estimates for 29 countries (see Annex 1 for issues with the Nigeria survey) and additional data for 100 additional countries and areas from the [World Poverty Clock](#), researchers at the Pardee Center for International Futures at the University of Denver have calculated extreme poverty headcounts by sex and age for the period 2015-2050 (129 countries and areas).

Due to the pandemic, the researchers also estimated COVID-19-adjusted extreme poverty headcounts resulting from the [IMF's June 2020 downward revision in global economic growth](#). Other crucial factors regarding COVID-19-specific representative data at the country, regional and global level – such as increased childcare burdens, reduced public and private spending on services such as education or childcare – which impact women more than men, are not accounted for in this analysis.

Consistent with the joint research published by [UN Women and the World Bank](#), the estimates from this analysis point to gaps in poverty as being highest from the ages of 25–34, a crucial finding to understand the life-cycle gender differences in poverty. However, an important caveat and reminder is that the global and regional figures based on the analysis presented in this note and the accompanying spreadsheet are based on a sample of 129 countries and areas (see Annex 1 for further details), unlike the UN Women and

World Bank estimates, which were based on a sample of 91 countries. The survey years may also vary, and this current analysis may be based on more recent survey data. Thus, caution should be exercised in comparing poverty estimates from the two datasets (see Annex 2 for further details).

Extreme poverty forecasts by sex and age – model information

The International Futures (IFs) tool, developed by the Frederick S. Pardee Center, makes use of historical data (over 4,500 historical series), identifies and measures trends, and models dynamic relationships to forecast hundreds of variables at the global, regional and country level.

The model assumes that the dynamics of the age-sex poverty rates in a country depend on three types of drivers: 1) drivers of poverty at the national level,¹⁵ 2) drivers of age-group-specific poverty, such as household consumption per capita inequality using the Gini Index; and 3) drivers of the gender gap in poverty (female-to-male ratio of adult educational attainment, the wage ratio between women and men, the crude birth rate, and expenditures on social protection).

The International Futures tool relies on statistical analysis to estimate differences in extreme poverty rates by sex and by sex and age. Ideally, there should be one best model for each age group. However, group interdependence, data limitations and the possibility of compounding error make it impractical to develop models for each of the age groups. Therefore, this study focuses on the 25–34 age group for the statistical estimation of the sex difference in poverty.

The intensity of poverty within different age groups generally correlates with the level of development (approximated using GDP per capita at purchasing power parity). Given this relationship, IFs assumes that as a country grows in prosperity (i.e. approaches a GDP per capita at PPP of USD 37,500), the age-distribution of poverty begins to look more like that found in high-income economies.

To develop a model of the sex difference in poverty rates (for the reference age group), a set of variables having both conceptual and empirical relevance (i.e. indicators identified by the literature or by experts as being potentially important in determining age and sex difference in poverty rates) were selected.¹⁶ The resulting model included the following: the female-to-male ratio of adult educational attainment, the wage ratio between women and men, the crude birth rate and expenditures on social protection (such as family and child benefits, unemployment and housing-related transfers).¹⁷

The ‘sex difference in poverty rate’ variable is initialized by data from the World Bank and World Poverty Clock. Initial differences between data and model estimates are renamed as shift factor,¹⁸ which is added to the model-based estimate on an annual basis, in order to preserve the residual between expected and observed values but which vanishes linearly over a period of 50 years. Non-reference group (groups other than the 25–34 age group) forecasts are estimated by applying period growth rates for the reference group to initial values.

Finally, once the poverty gender difference is obtained for a specific age group, the previously estimated age-group poverty rates and the age-sex population can be used to compute the age-group poverty rates by sex, using the following logic:

$$POVRATE_{a,s=male,r,t} = \frac{POVRATE_{a,s=Total,r,t} * POPOVAG_{a,s=Total,r,t} - PovGndDiffAG_{r,a,t} * POPOVAG_{a,s=Female,r,t}}{POPOVAG_{a,s=Total,r,t}}$$

$$POVRATE_{a,s=female,r,t} = PovGndDiffAG_{r,a,t} + POVRATE_{a,s=male,r,t}$$

where *POVRATE* is poverty rate by age (*a*), sex (*s*), country or region (*r*), and time (*t*), *POPOVAG* is the population size of the age/sex-specific group, and *PovGndDiffAG* is the sex difference in poverty by age.

The drivers listed so far are those that are most directly related to the calculations of age-specific poverty rates and the sex-difference in poverty. However, each of these drivers, as well as many of the variables used to constrain these estimates (such as national poverty levels or population by age and sex), are in turn driven by a larger set of economic, demographic and sociopolitical drivers.

Poverty income shortfall analysis

The International Futures model also estimates the cost associated with lifting all persons of a particular age-sex demographic who are struggling to survive on less than \$1.90 per day (PPP) up to the \$1.90 threshold. This calculation draws on the Poverty Gap (POVGAP) indicator, a widely used measure of the depth of poverty of a country. This measure is used along with total population (POP) and the national extreme poverty headcount (INCOMELT190LN) to calculate the average shortfall per person living in extreme poverty (PerPoorShortFall), using the following equation:

$$PerPoorShortFall_{r,t} = 365 * 1.9 * (POVGAP_{r,t}/100) * POP_{r,t} / INCOMELT190LN_{r,t}/1000$$

The Per Poor Shortfall (expressed in terms of PPP) is multiplied by the number of poor people in each of the age-sex groups (POVCOUNT) to compute poverty shortfall for each group (POVSHORT).

$$POVSHORT_{r,a,s,t} = POVCOUNT_{r,a,s,t} * PerPoorShortFall_{r,t}$$

Scenario analysis

Scenario analysis in this model allows users to explore the impact that alternative assumptions might have on long-run outcomes. Such assumptions could be associated with developmental patterns, initial conditions, or the relationships between variables. For example, to explore alternative futures related to women's poverty, users can construct scenarios introducing more (or less) rapid changes of the direct and indirect drivers described above.¹⁹ Exploring these scenarios in isolation can help to inform the impact that pursuing a particular policy may have on reducing the number of women and girls living in extreme poverty or in closing the gap between women and men. Similarly, combining multiple interventions in a single scenario can inform the impact of pursuing a more comprehensive strategy.

Forecasts of poverty by sex: comparison with World Bank, UNU-WIDER and other forecasts

For purposes of comparison and cross-validation, the International Futures database also maintains a collection of projections provided by other organizations. These forecasts cover multiple variables related to economics, education, energy, demographics and infrastructure, often with multiple variants deriving from alternative scenario assumptions – such as Shared Socioeconomic Pathways and the UN Population Division's fertility variants. Macroeconomic and demographic projections from the model are for the most part in line with forecasts produced by other organizations or fall within alternative scenario variants.

Using the Pardee Center data, the estimate based on the IMF June 2020 downward revision is 96 million additional poor. The upper range (i.e. if Gini increases 2.5 per cent over 5 years relative to Base Case) is 104 million. However, other forecasts are also available on this topic, with a number of additional scenarios. Hence, forecasts reported in the report range from 70 to 135 million.

World Bank: The estimates on the number of people who will be pushed into poverty as a result of COVID-19 are based on the IMF's downward revisions of the GDP forecasts for countries. The IMF released these forecasts in April 2020 as well as in June 2020. Based on these revisions, the World Bank released predictions of extreme poverty available [here](#). The authors of the blog state that based on the April 2020 downward revisions, anywhere from 40–60 million additional people will be pushed into extreme poverty, which was revised to 70–100 million based on the June 2020 forecasts.

The World Bank also recently released additional estimates using [inequality and GINI-based scenarios](#), based on which their estimate for a low GINI increase scenario is 116 million. They also reported that a 2-percentage-point decline in GDP growth, vis-a-vis the downside scenario, would raise the number of additional extreme poor to 124 million. Thus, the range of the World Bank's forecasts is from 70 million to 124 million in 2021, depending on the scenarios that actually come into play. Further details on World Bank methodology are available [here](#).

UNU-WIDER: The UN University's World Institute for Development Economics Research (UNU-WIDER) also released estimates on extreme poverty and COVID-19. Its researchers forecast that as few as 85 million and as many as 135 million people – nearly 2 per cent more of the world's population – could become poor as a result of COVID-19. The working paper available [here](#) offers additional details.

Lastly, the **World Poverty Clock (WPC)** project (from which this project derives a significant portion of age-sex poverty initializations) also provides poverty forecasts to 2030. The major difference between global poverty projections from WPC and the International Futures model can be traced back to initial estimates of Indian poverty, which WPC adjusts in order to account for reporting discrepancies between survey and national accounts data.

Annex 1: Country-level information on poverty by sex and age

The dataset originally includes 186 countries and areas for which estimates on extreme poverty are available. However, there are 57 countries and areas in the sample where extreme poverty is zero or near-zero in some age cohorts and/or in all age cohorts – mostly upper middle-income and high-income countries and areas, based on the World Bank Classification. These countries and areas have been excluded from the calculation of global and regional aggregates, which are thus based on a sample of 129 countries and areas only. Tables 1 and 2 present snapshot figures for select years.

Table 1: Extreme poverty headcount and global poverty rates by sex

Year	Poverty Headcount (millions)		Poverty rate (%)	
	Female	Male	Female	Male
2019	398.5	392.3	11.7	11.3
2020	408.9	402.9	11.9	11.5
2021	434.8	430.3	12.5	12.1
2030	397.6	394.0	10.4	10.2

Note: Based on a sample of 129 countries and areas, where the extreme poverty headcount is > 0 for 2019 and 2020. Sample represents 89 per cent of global population in 2020.

Table 2: Extreme poverty headcounts and poverty rates by sex, global and SDG regions, select years

Regions	2021				2030			
	Poverty Headcount (millions)		Poverty rate (%)		Poverty Headcount (millions)		Poverty rate (%)	
	Female	Male	Female	Male	Female	Male	Female	Male
World	434.8	430.3	12.5	12.1	397.6	394.0	10.4	10.2
Sub-Saharan Africa	249.1	246.3	44.5	43.8	282.8	282.4	40.1	39.5
Northern Africa and Western Asia	12.6	12.9	5.6	5.7	9.9	10.2	3.8	3.9
Northern Africa	4.6	4.8	3.7	3.8	3.4	3.7	2.4	2.5
Western Asia	8.0	8.1	7.8	8.0	6.5	6.5	5.6	5.7
Central and Southern Asia	128.1	127.2	13.2	12.4	74.1	71.8	6.9	6.4
Central Asia	7.1	7.8	25.6	28.2	5.0	6.0	16.4	19.6
Southern Asia	121.0	119.4	12.8	11.9	69.1	65.8	6.7	6.0
Eastern and South-Eastern Asia	18.9	19.0	1.9	1.8	10.6	10.2	1.0	1.0
Eastern Asia	6.0	6.3	0.8	0.8	4.5	4.1	0.6	0.6
South-Eastern Asia	12.9	12.8	4.3	4.2	6.1	6.1	1.9	1.9
Latin America and the Caribbean	20.9	20.0	6.3	6.2	17.4	16.9	4.9	4.9
Central America	4.2	4.2	4.6	4.7	2.7	3.0	2.7	3.1
South America	15.1	14.2	6.9	6.6	13.0	12.2	5.5	5.3
Caribbean	1.6	1.6	8.2	7.9	1.7	1.6	7.9	7.9

Australia and New Zealand	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Oceania excluding Australia and New Zealand	1.2	1.2	23.5	22.8	0.6	0.6	10.8	10.3
Europe and Northern America	-	-	-	-	-	-	-	-
Europe	-	-	-	-	-	-	-	-
Northern America	-	-	-	-	-	-	-	-
Landlocked developing countries	86.8	86.3	34.2	34.0	92.7	93.1	29.8	29.6
Least developed countries	192.0	189.2	35.5	34.9	215.8	215.2	32.7	32.2
Small island developing states	3.9	3.9	14.0	13.7	3.7	3.7	11.9	11.8

Note: Based on a sample of 129 countries, where the extreme poverty headcount is > 0 for 2019 and 2020. Sample represents 89 per cent of global population in 2020.

Annex 2: Further information on comparison of World Bank and Pardee Center estimates

The joint UN Women and World Bank estimates on extreme poverty by sex and age are computed using the World Bank Global Monitoring Database (GMD), which is a collection of globally harmonized household survey data that includes survey data on 91 economies from the years 2010–15, excluding high-income countries and countries for which data is lacking in this period. Countries in the GMD have a population of roughly 77 per cent of the developing world population. In comparison, the Pardee estimates are based on 129 countries and areas ranging from years 2010–2018 with 97.5 per cent of the developing world population (Table 3). Additionally, differences in survey years and the sample of countries can be a contributing factor in differences between the World Bank and Pardee Center estimates.

Table 3. Coverage of low- and middle-income countries (LMIC) in GMD sample, by region

Region	% LMIC population in GMD – WB	% LMIC population in Pardee database
Central and Southern Asia	92.0%	98.0%
Europe and Northern America	20.9%	87.6%
Eastern and South-Eastern Asia	88.6%	96.6%
Latin America and the Caribbean	91.2%	99.9%
Northern Africa and Western Asia	51.3%	96.6%
Oceania (excluding Australia and New Zealand)	14.3%	89.5%
Sub-Saharan Africa	87.0%	99.6%
World	76.8%	97.5%

Another major contributor to the differences in estimates between the two datasets is in the survey used for Nigeria – a country with high extreme poverty for women.²⁰ In the GMD, the survey used for Nigeria is the [Living Standards Survey 2009/10](#), while the data used by Pardee is the [General Household Survey for 2012/13](#), which is believed to be of [higher quality](#) and is more recent. A sensitivity analysis of Pardee and World Bank estimates shows that the poverty estimates by sex and age for the 25–34 cohort become quite comparable when Nigeria is excluded from the sample of countries.²¹

Annex 3: Further information on the dataset and additional background on International Futures forecasting tool

The top-level global analysis on poverty headcounts based on a set of demographic and other policy scenarios (welfare transfers, etc.) as well as income shortfall analysis were included in UN Women’s recent report “*From Insights to Action: Gender Equality in the Wake of COVID-19*”. The regional and country-level data from these analyses are available upon request.

Additional background on research organization and the International Futures forecasting tool

The Frederick S. Pardee Center for International Futures is based at the Josef Korbel School of International Studies at the University of Denver.

The International Futures forecasting tool is useful for thinking about long-term country-specific, regional and global futures. The tool integrates forecasts across different sub-models, including: population, economy, agriculture, education, energy, sociopolitical, international political, environment, technology, infrastructure and health. The model’s structure allows users to explore development within and across each of these key global systems.

Developed over the course of four decades, the International Futures model’s code is open-source and publicly available. Its code, databases and technical documentation are maintained by the Pardee Center. The user interface is proprietary and developed solely by the Pardee Center.

Prior to this collaboration with UN Women and UNDP, the International Futures model had not focused on gender-related analysis. This strategic collaboration has enhanced the tool and expanded its utility for forecasting long-term regional and global futures from a gender perspective, most especially the tool’s ability to forecast poverty by sex and age.

Additional links

The initialization processes in the International Futures’ pre-processor: <https://pardee.du.edu/data-pre-processor-international-futures-ifs>

Logic for poverty forecasts in the model: https://pardee.du.edu/wiki/Economics#Poverty_2

Pardee's *Patterns of Potential Human Progress*, volume on Poverty: <https://pardee.du.edu/pphp-1-reducing-global-poverty>

ENDNOTES

¹ Papa Seck, Ginette Azcona and Antra Bhatt (UN Women); Serge Kapto (UNDP); Jonathan Moyer, David Bohl, Mohammad Irfan, Barry Hughes, and Yutang Xiong at the Frederick S. Pardee Center for International Futures. The team acknowledges the valuable data analysis and substantive inputs and comments provided by Guillem Fortuny and Kaylin McNeil. The team would also like to express their gratitude to Enrique Delamónica (UNICEF), Sara Hertog (UNDESA – Population Division), Carolina Rivera (UNDP-HDRO), Yu-Chieh Hsu (UNDP-HDRO) for their thorough review of this technical note and for their participation in the Expert Group Meetings related to this project. Thank you also to Daniela Casale (The University of the Witwatersrand, Johannesburg), Roger Gomis (ILO), Lars Jensen (UNDP) and Aroa Santiago (UNDP), additional participants of the Expert Group, who provided expert advice and substantive comments, suggestions and inputs throughout the project.

² The analysis is based on household-level data and therefore relies on a household measure of monetary poverty. Extreme poverty rates by sex refer to the share of females and males living in poor households. Information on intra-household division of household income or consumption are not available and thus gender inequality in the allocation of resources within the household are not captured in this analysis. See methodological section below for further details. Other hard-to-reach populations (e.g. homeless) and populations living in institutions are also not captured in household surveys and thus often missing from global, regional and country headcounts of extreme poverty ([UNECE 2020](#)).

³ [IMF. 2020](#). *World Economic Outlook Update, June 2020: A Crisis Like No Other, An Uncertain Recovery*.

⁴ This forecast takes into account the IMF's latest June 2020 revision of the world economic outlook. However, as echoed in the [IMF 2020](#) report, there is a significant amount of uncertainty around the global growth forecasts and in turn forecasts of extreme poverty derived from these. For one, the contraction in 2020 may be more acute than expected and the pandemic more long-lasting and severe. A greater number of workers may be displaced than projected and a large number of female workers in particular may be forced to exit the workforce permanently. These and other factors may result in an even greater number of women, men and children pushed into extreme poverty. These projections on extreme poverty will be updated as more information becomes available, including on the uneven impact of the crisis on women's employment and income prospects.

⁵ Due to male-biased population sex ratios, caution is advised when making comparisons of the extreme poverty headcount by sex. An estimated 48.8 million men and boys will be pushed into extreme poverty globally in 2021 as a result of the crisis. This absolute figure is slightly higher than the 47.1 million projected for women and girls. Underlying these figures, however, are large biases against women and girls in the overall population structure of key countries included in our poverty analysis. According to the latest global population estimates, there are 66 million more men and boys than women and girls. The ratio of poverty rates by sex is a useful measure that accounts for the skewed population effect. It is used later in the paper to compare women and men's vulnerability to extreme poverty by sex and age. For further reading on biased sex ratios, see for example [Das Gupta and Shuzhuo 1999](#) and [Denyer and Gowen 2018](#). For approaches to poverty by sex analysis, which account for skewed sex ratios in the population, see [CEPAL 2003](#) and [UN Women and World Bank 2008](#).

⁶ An increase in the extreme poverty headcount is projected for the year 2020 and 2021 – an increase not seen since the 1990s. The situation is projected to improve thereafter. However, as indicated earlier, many variables, including the extent of the impact on low-income families, remain uncertain and unknown (see footnote 3).

⁷ The world's extreme poor are overly represented in these two regions, 57 per cent of the extreme poor live in sub-Saharan Africa and 30 per cent in Central and Southern Asia. In contrast, the two regions account for only 16 and 28 per cent of the global population, respectively.

⁸ Higher rates of fertility than other regions, particularly among the poorest households, can play a role in the region's growing concentration of extreme poverty as compared to other regions. See [Wietzke 2020](#) for a description of how demographic variables, including fertility rates and child mortality, influence global and regional poverty reduction.

⁹ For further analysis on child extreme poverty, see [Newhouse et. al 2017](#).

¹⁰ Differences in extreme poverty rates among girls and boys are generally marginal at the global level. This is before extreme poverty is measured at the household level and poor and non-poor households are equally likely to have girl and boy children. In some countries, however, sex ratios among children aged 0–4 are significantly skewed against girls and the bias varies by household income, see for example [Kishor and Gupta 2005–06](#).

¹¹ The ratio between (the number of women aged 25–34 years in poor households / Number of men aged 25–34 years in poor households) / (Total number of women aged 25–34 years / Total number of men aged 25–34 years) * 100. Sometimes called the 'femininity index', this measure is equivalent to the ratio between the poverty rate of women over the poverty rate of men and is used instead of the poverty headcount to account for skewed sex ratios, especially across certain age groups. See [here](#) for exact methodology of calculation and [here](#) for interpretation of the ratio. Any interpretation of these ratios at the country level must be accompanied by a close review of the relevant extreme poverty rates/levels. This is crucial because in countries with low levels of overall extreme poverty any difference in the poverty rates by sex will, by the nature of the low base values, appear large. For

example, in a hypothetical country with a poverty rate of 1.5 per cent for women and .5 per cent for men, the ratio would yield 300, while in another hypothetical country with a poverty rate of 55 per cent for women and 50 per cent for men, the ratio would yield 110.

¹² The regional average for Central and Southern Asia is driven largely by India and Bangladesh, given the two countries' large populations and projected increase in extreme poverty headcount. In both countries, GDP per capita is expected to revert to pre-pandemic levels by 2022, leading to a decrease in overall poverty rates dynamically. However, drivers of the age-sex poverty gap – such as fertility, wage gaps and welfare transfers – are not forecast to increase at comparable levels, leading to a worsening of poverty ratios.

¹³ Here the 'cumulative cost' of eradicating extreme poverty refers to the absolute minimum amount that would be required to bring the daily income/consumption of the extremely poor population to USD \$1.90 per day. This analysis does not take into account any program design and implementation costs that would accompany this endeavor.

¹⁴ UN Women, UNDP and Pardee Center for International Futures at the University of Denver.

¹⁵ National poverty rates discussed in this note refer to the international measure of extreme poverty defined as consumption of less than \$1.90 per day. In the International Futures model, extreme poverty is driven as a function of household consumption per capita, inequality (using the Gini index), and a log-normal assumption of income distribution. Household consumption per capita and inequality are in turn driven by a number of other variables, see <https://pardee.du.edu/ifs-economic-model-documentation>.

¹⁶ Selection of variables was further restricted to those that were available in the IFs tool.

¹⁷ The variable 'expenditures on social protection' is obtained from the IMF's Government Financial Statistics database. Details regarding each of the sub-components can be found in the [IMF GFS Statistics Manual](#).

¹⁸ In this model, the IF's model-based estimates are compared with data from the World Bank and the World Poverty Clock. The initial difference between these two values (the residual) is stored and renamed as a "shift factor". The shift factor is added to each IFs model estimate so that there is continuity between historical values and forecasts.

¹⁹ The scenarios used in this analysis will be available in the next public International Futures release (expected in Fall 2020) downloadable from pardee.du.edu. For more information on scenarios-construction (either modifying existing scenarios or building new ones), please see the *Guide to Scenario Analysis* (<https://pardee.du.edu/guide-scenario-analysis-international-futures-ifs>).

²⁰ In the year 2021, 60 million women and 54 million men will be living in extreme poverty. The main countries that contribute to this are India (15 million), closely followed behind by Nigeria (8 million).

²¹ In the case of Nigeria, the 2019 estimates from the Pardee Center estimate 7 million women and 6.9 million men will be living in extreme poverty (gender parity). UN Women/WB estimates (using earlier survey) found 6.5 million women and 4.5 million men. These estimates suggested a bias against women, that is, 144 women living in extreme poverty for every 100 men. For the 30 countries for which data on extreme poverty is publicly available from the World Bank, the overall femininity index (female/male) is 121 and 114 from Pardee Center (using 2015 initializations). However, if Nigeria is excluded, those numbers become comparable: 117 for both the World Bank and the Pardee Center.