Global development assistance for early childhood care and education in 134 low- and middle-income countries, 2007-2021

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2

Abstract

Background

Providing quality early childhood care and education (ECCE) is widely recognized as a fundamental strategy for lifelong individual and societal benefits. However, the expansion of ECCE in low- and middle-income countries (LMICs) is impeded by limited financial resources. Little is known about the levels and trends of global development assistance (DA) allocated to ECCE in LMICs between 2007 and 2021.

Methods

We extracted data from the Creditor Reporting System (CRS) on aid projects in 134 LMICs from 2007 to 2021. Using keyword-searching and funding-allocation methods, we generated two estimates of ECCE aid: one for DA primarily focused on ECCE, and another for DA both primarily and partially focused on ECCE as well as DA not explicitly targeting ECCE but benefiting ECCE. We analyzed the patterns and time trends of ECCE aid by donors, recipients, CRS sectors, implementing agencies, and aid-flow types. We calculated ECCE aid as a percentage of educational aid at both annual and aggregative levels, comparing it to UNICEF's recommended allocation of at least 10% of educational aid to the ECCE sector in LMICs. Additionally, we explored the alignment of aid with addressing children's learning losses during global crises by examining ECCE aid to projects involving COVID-19 prevention and mitigation, along with ECCE aid to conflict-affected countries.

Results

From 2007 to 2021, primary ECCE-focused DA amounted to US$3,646 million, accounting for 1.7% of the total US$213,279 million allocated to education. The World Bank led all donors with US$1,944 million in ECCE aid (53.3%). Low-income countries consistently received less ECCE aid per child before 2016, then started to catch up, but subsequently experienced a decrease from US$0.8 (2020) to US$0.6 (2021). In contrast, lower-middle-income and upper-middle-income countries saw an increase from US$0.4 (2020) to US$0.6 (2021) and from US$1.0 (2020) to US$1.3 (2021), respectively. ECCE aid to projects with COVID-19 activities declined from US$50 million in 2020 to US$37 million in 2021, representing 11.4% and 6.6% of annual ECCE aid. Over 15 years, conflict-affected countries received an average of US$0.3 per child, only a quarter of the aid received by non-conflict-affected countries (US$1.2 per child).

Conclusion

Although ECCE aid increased significantly between 2007 and 2021, its share of total educational aid remained small and fell far short of the recommended minimum of 10%. Our recommendations include increasing the share of ECCE aid in total educational aid, raising aid to low-income and conflict-affected countries, and investing more in preparing ECCE programs for future global crises.

4

INTRODUCTION

Extensive interdisciplinary research has underscored the significant connection between children's engagement in quality early childhood care and education (ECCE) and a wide array of lifelong individual benefits, as well as broader socioeconomic development[1-5]. Recognizing the imperative role of ECCE, the United Nations set universal access to quality ECCE as part of its educational agenda in the Sustainable Development Goals (SDGs)[6]. However, the progress towards ECCE fell short even before the COVID-19 pandemic hit – globally, only 54% of children between the ages of three and primary-school entry were enrolled in ECCE programs, leaving at least 180 million young children not benefiting from ECCE programs in their preparation for future education[7]. A series of global crises – the COVID-19 pandemic, regional armed conflicts and the growing climate crisis– further exacerbated already low ECCE enrollment rates, resulting in unprecedented potential developmental loss for both individuals and societies[7-9]

To promote children's development amid these global threats, urgent actions are needed to expand and enhance ECCE programs. However, in low- and middle-income countries (LMICs), these efforts have long been hindered by limited financial resources for education and a skewed allocation of educational funds toward higher educational levels[10,11]. For instance, sub-Saharan African countries spend, on average, only 0.3 percent of their public educational budgets on pre-primary education[10]. While domestic governments are expected to be the primary funders for ECCE programs in the long term, international donors play a crucial role in mobilizing spending, increasing ECCE access, improving service quality, and catalyzing ECCE

5

reforms[10]. The UNICEF recommends that at least 10% of educational aid should be directed to the ECCE sector in LMICs[12]. However, there is limited information available regarding progress in ECCE aid. Monitoring the allocation of aid to ECCE in LMICs is vital for ensuring donor accountability and providing recipient countries with the necessary data for evidence-based budgeting.

Prior research has made attempts to quantify ECCE aid in LMICs. Utilizing data from the Organization for Economic Cooperation and Development (OECD), one study[13] demonstrated a relatively stable level in aid between 2005 and 2014, in contrast to a substantial increase in funding for primary and secondary education. Another study[14] estimated that annual aid for ECCE between 2012 and 2015 amounted to a mere $74 million, constituting only 0.6% of total education aid. Furthermore, a study[15] observed fluctuations in ECCE aid between 2007 and 2013, followed by a consistent increase from 2014 to 2016. While valuable, these studies were limited by short study durations, constrained analysis of aid levels and trends, and identification strategies that could overlook ECCE aid disbursements in the OECD database.

Our study seeks to enhance the understanding of ECCE aid in 134 LMICs between 2007 and 2021. We systematically assessed bilateral and multilateral aid flows from national donors, multilateral institutions, and private sources. We examined levels and trends of ECCE aid in terms of the total amount and per child age-eligible for ECCE (hereafter referred to as "ECCE-age" child) at global, regional, and country levels. We analyzed the pattern of ECCE aid by donors, recipients, aid sectors, implementing agencies, and flow types. We also investigated ECCE aid to projects that included COVID-19 prevention and mitigation activities and ECCE aid to conflict-affected

6

countries. Our study aims to establish a baseline for ECCE aid in LMICs, identify active donors and underinvested recipients, examine aid mechanisms, and assess the alignment of ECCE aid with global challenges.

METHODS

Data sources

We extracted global development-assistance data from the Organization for Economic Cooperation and Development's (OECD) Creditor Reporting System (CRS)[16], where development assistance refers to aid intended to support the socioeconomic development and welfare of developing countries[17]. The CRS database is a publicly accessible source that records information on aid projects. These projects are mandatorily reported by all OECD Development Assistance Committee (DAC) member countries and voluntarily reported by non-DAC states, multilateral institutions, and private entities[18,19]. We downloaded the 2007-2020 CRS data in May 2022 and the 2021 CRS data in January 2023. The CRS data included information on all aid projects implemented in 155 recipient countries or territories. We excluded 21 recipients classified as high-income or without income classifications according to the World Bank's 2020 standard[20]. This resulted in 134 LMIC recipients being included in our study (**Appendix, Table A1**).

Donors disbursed aid to the 134 LMICs over various years. **Table A2a-A2d in Appendix** presents a breakdown of donors and the corresponding years in which each donor reported aid within our study period. Following previous studies and OECD's

7

recommendations, we excluded CRS data before 2007 because of the high missing rate, which subsequently reached nearly 100% completeness[18,21-23]. To assess ECCE aid per ECCE-age child, we calculated the total number of ECCE-age children for each country using data from UNESCO's Institute for Statistics (UIS)[24]. This calculation involved aggregating each country's eligible population for early childhood educational development programs and pre-primary educational programs. For cases with missing data in these eligible populations, we applied imputations as detailed in **Text A1 of the Appendix**.

Defining and estimating aid for early childhood care and education

Defining aid for early childhood care and education

We adhered to UNESCO's definition of ECCE as *programs supporting children's holistic development from birth until their entry into primary education*[25]. ECCE programs could be conducted in either formal or non-formal organized settings, with a focus on providing childcare and nurturing children's physical, cognitive, language, and socioemotional development. Examples of ECCE programs include daycare, pre-primary schools, and community- and center-based childcare and educational programs designed for young children in group settings[25,26]. We defined ECCE aid as development assistance that supports ECCE programs in LMICs.

Estimating aid for early childhood care and education

The CRS database categorizes each aid project into a sector first and subsequently

8

into a purpose to specify the intended socioeconomic area of support for the recipients. For ECCE aid, the CRS database creates a "Basic education" sector and an "Early childhood education" purpose (purpose code: 11240) to allow donors to report aid projects focused on formal and non-formal preschool education[19]. However, our random check of project descriptions found that some projects under this purpose may exclusively focus on higher-than-ECCE education. Therefore, we conducted a manual review of each project under the 11240 purpose and excluded projects exclusively focused on education levels higher than ECCE (171 out of 6,941 projects).

Furthermore, we found that projects reported in other CRS sectors and purposes, such as the "Other social infrastructure and services" sector, may also involve ECCE activities. This finding emphasizes the need for a multisectoral approach when searching for ECCE aid projects. Consequently, we conducted a comprehensive search across all CRS sectors and purposes, excluding the 11240 purpose. **Table A3 in Appendix** lists the CRS sectors we used for searching ECCE projects.

To identify projects with ECCE activities from other CRS sectors and purposes, we adopted the methodologies used in previous studies on estimating development assistance on health[21-23,27-31]. We began by creating a list of keywords related to ECCE based on a review of existing ECCE literature. These keywords were then used to search in the titles, short descriptions, and long descriptions of aid projects. We categorized the keywords into two groups: (1) ECCE-specific keywords, such as "preschool", which explicitly refer to ECCE programs, and (2) general care/education keywords, such as "safe learn", which refer to care and educational activities without specifying the age of the beneficiaries or educational levels. To enhance the search

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results from the general care/education keywords, we compiled a list of age-related terms, such as "under five" and "child/boy/girl". We then searched for the presence of these terms among the projects that were exclusively identified by the general care/education keywords. Only projects that contained either the ECCE-specific keywords or the combination of the general care/education keywords and the age-related terms were retained for further manual review. We translated and searched the keywords and terms in nine languages. **Table A4a-A4b in Appendix** presented the keywords and terms used in this study.

Next, we manually reviewed the projects that fulfilled our search strategy's criteria. We made decisions on whether a project either (1) primarily focused on ECCE, (2) partially focused on ECCE, (3) focused on childcare or child education without specifying children's age or education level. We excluded false positive projects that did not have ECCE or children's care and education activities. **Figure A1 in Appendix** illustrates each step of our project search and review process.

Previous studies have noted that using keyword searches in the CRS database may lead to the omission of certain relevant projects due to the imperfect sensitivity of this strategy[27-29]. To assess our search sensitivity, we randomly selected 10% of aid projects from 2020 within four CRS education sectors – "basic education", "secondary education", "post-secondary education", and "education, level unspecified". We separately applied manual review and keyword search to these selected projects and compared results. We found that our keyword search missed approximately 2.6% of projects manually identified as having ECCE activities, accounting for only 0.04% of the corresponding total funds. This outcome confirmed

10

the robustness of our search strategy.

Following the review, we generated two estimates of ECCE aid: the lower-bound and the upper-bound estimate. The lower-bound estimate included total aid disbursements to projects categorized under the CRS "Early childhood education" purpose (except for those to the 171 projects exclusively focused on higher-than-ECCE educational activities) and projects deemed as primarily focused on ECCE. The upper-bound estimate included the lower-bound estimate, allocated disbursements from projects partially focused on ECCE, and allocated disbursements from projects focused on childcare and child education without specifying children's age and educational levels. Furthermore, we considered that aid projects under the CRS "Education, level unspecified" sector and the "General budget support" sector may also benefit ECCE, and allocated part of these disbursements to the upper-bound estimate.

The allocation was conducted in the following ways. For projects that include ECCE along with higher-than-ECCE educational activities (e.g., primary education), we allocated projects' disbursements to the country's ECCE population based on the country's year-specific proportion of ECCE-age children relative to its total eligible population for the educational levels specified in the project. Given that countries generally have higher (often much higher) expenditures per child for higher-than-ECCE educational activities than for ECCE-age activities, this allocation almost surely overestimates the allocation to ECCE-age activities. For childcare and child education projects without children's age and education level specification, we allocated disbursements based on the country's year-specific proportion of its ECCE-age children to its total eligible population from ECCE to tertiary education. Again,

11

this allocation almost surely overestimates the allocation to ECCE-age activities. We did not allocate disbursements of projects involving ECCE and non-formal educational sector activities, such as projects primarily focused on women empowerment that integrate ECCE activity as a component, due to the lack of detailed information at the activity level. We included the total aid disbursements of these projects in our upper-bound estimate. Lastly, donors may report project recipients as "regional" or "bilateral" without specifying which country is eligible to receive the funds. Based on previous studies[22,29], we allocated "regional" funds among LMICs within the region according to their year-specific shares of ECCE-age children and allocated "bilateral" funds to every country in proportion to its year-specific share of the total ECCE-age children.

Table A5 in Appendix presents details of all the allocation strategies we used in constructing the upper-bound estimates. We aligned with previous studies[21-23,30,31] by using donors' gross disbursements rather than commitments to quantify ECCE aid. Out of the 31,268 gross disbursements from projects primarily and partially focused on ECCE, we excluded 132 disbursements with negative values, as they are inconsistent with OECD's definition of gross disbursement, which employs positive values to reflect gross aid flows from donors to recipients[32]. Additionally, we excluded 1,476 disbursements with missing monetary values.

Defining and estimating ECCE aid to projects with COVID-19 activities

We paid special attention to aid for ECCE programs with COVID-19 activities. The CRS database used a purpose "COVID-19 control" to track projects with activities

12

related to COVID-19 immunization, testing, prevention, treatment and post-recovery therapies, and a hashtag variable "#COVID-19/COVID-19" to track projects aimed at mitigating socioeconomic impacts of the pandemic[33,34]. However, our project review indicated that projects listed under the "COVID-19 control" purpose or projects marked with the hashtag may not necessarily specify COVID-19 activities in their descriptions. Therefore, we compiled a list of COVID-19 keywords and searched for their presence in titles and descriptions among all the ECCE projects we identified for 2020 and 2021 (see keywords in **Table A4c in Appendix**). We manually reviewed each project that survived the search and eliminated false positives. We compared the total ECCE aid in 2020 and 2021 with aid disbursements to ECCE projects with COVID-19 activities.

Defining and estimating ECCE aid to projects in conflict-affected countries

There is extensive evidence demonstrating the pervasive negative effect of armed conflicts on children's development[35,36]. This adverse impact on children is partially mediated by the lack of access to ECCE[37]. We estimated ECCE aid invested in conflict-affected countries throughout the study period. Consistent with previous studies and defined conflict-affected countries as those who were either in conflicts or in post-conflict stages in the period between 2007 and 2021. We followed previous studies in the definition of "conflict" as major armed battles with at least 1,000 battle-related deaths in one year[30].

We identified a country as being in its post-conflict stage if its conflict occurred between 2004 to 2006 but ended before 2007. We used Uppsala University Conflict

13

Database[38] for battle-related deaths to identify conflict-affected countries. We also supplemented our list of conflict-affected countries with the World Bank's classification of Fragile and Conflict-Affected Situations[39]. We identified 28 conflict-affected countries within the study period (**Table A6 in Appendix**). We compared the average ECCE aid per child in conflict-affected countries with the corresponding amount in non-conflict-affected countries.

Analyzing ECCE aid

Using both the lower-bound and upper-bound estimates, we tracked levels and trends of ECCE aid in terms of total amount and per ECCE-age child between 2007 and 2021 at global, regional, and country levels. We also assessed levels and trends by recipient countries grouped into low-income, lower-middle-income, and upper-middle-income groups.

We identified the top donors and recipient countries, tracked the CRS sectors to which ECCE aid was allocated, and identified the channel agencies that were responsible for implementing ECCE aid projects in the field. In cases where aid projects had missing information regarding channel agencies, we substituted their missing with the most frequently employed agency of the same donor throughout the study period. For donors who did not report channel agencies for any ECCE projects, we assumed that the donors implemented the projects themselves.

Additionally, we examined the flow types of ECCE aid. The CRS database categorizes aid into official development assistance (ODA) grants, ODA loans, other

14

official flows, and private development finance. ODA grants are non-repayable funds to recipient countries, while ODA loans require repayment that offer favorable terms such as lower interest rates or extended repayment periods. Other official flows are aid transactions with developmental goals but do not meet the criteria of ODA grants or loans. We included "private development finance" in our analysis due to its primary development-focused nature, as compared to commercial revenues[40,41].

Furthermore, we calculated each donor's ECCE aid as a percentage of its development assistance to education (DAE) disbursed during the SDG study years (2016-2021). We compared these percentages to UNICEF's recommendation, which suggests that donors allocate a minimum of 10% of their DAE to the ECCE sector[12]. For recipient countries with available data on ECCE gross enrolment rates[42] in 2020, we matched country's rank in enrolment with country's rank in cumulative ECCE aid per child received throughout the study period.

We also examine countries' cumulative ECCE aid per child against their most recent available data on the percentages of young children (36-59 months) developmentally on track as measured by the Early Childhood Development Index (ECDI)[43]. The ECDI is a 10-item index summarizing caregiver-reported information on children's achievement of some universal developmental milestones across countries. A child is deemed 'developmentally on track' if the child was on track in at least three of the four ECDI domains, including literacy-numeracy, physical development, social-emotional development, and learning. Within each domain, a child is considered to be on track if the child has at least half of the relevant skills[44]. Seventy-nine LMICs have available data on the percentages of children developmentally on track.

15

This article presents the lower-bound estimates as the main findings in the text, while the **Appendix** documents upper-bound results. All disbursements were expressed in constant 2020 US dollars. We used STATA 18.0 for analyses.

RESULTS

General levels and trends of ECCE aid

Between 2007 and 2021, a total of US$3,646 million in ECCE aid was allocated to 134 LMICs through 7,977 projects. **Figure 1** illustrates that the annual ECCE aid increased more than fivefold from US$71 million in 2007 to US$360 million in 2010. It then experienced a slight decrease to US$297 million in 2011, followed by a sharp decline to US$115 million in 2012. However, since 2013 it has been on an upward trajectory, reaching US$562 million in 2021. The peak in 2010 and 2011 was primarily due to increased disbursements from the World Bank to Brazil and Turkey, amounting to US$243 million and US$181 million, respectively. The notable decline in 2012 was driven by a reduction in aid from the World Bank (**Figure 2**). On average, ECCE aid accounted for 1.7% of the total DAE (US$213,279 million), with yearly percentages ranging from 0.6% in 2007 to 3.2% in 2021 (**Figure 1**).

ECCE aid by recipient countries' income group

Across all country-income groups, there was a noticeable increase in ECCE aid during the study period. However, the low-income country group (LICs) received less

16

aid than the middle-income groups for most of the years, reaching a share of only 12.3% (US$449 million) of total ECCE aid. Of concern, between 2020 and 2021, LICs saw a reduction in their funding from US$103 million to US$77 million, while middle-income countries continued to see increasing amounts (**Figure A2 in Appendix**). When considering population size, LICs consistently received less ECCE aid per ECCE-age child before 2016 but started to catch up afterwards. However, from 2020 to 2021, LICs saw a decrease from US$0.8 to US$0.6 per child, while lower-middle-income and upper-middle-income countries increased from US$0.4 to US$0.6 and from US$1.0 to US$1.3, respectively (**Table 1**).

ECCE aid by region of recipient countries

Over the span of 15 years, Latin America and the Caribbean region received the largest share of total ECCE aid (30.7%, US$1,118 million), followed by sub-Saharan Africa (21.8%, US$794), East Asia and Pacific (14.0%, US$511 million), Middle East and North Africa (12.7%, US$461 million), South Asia (10.6%, US$386 million), and Europe and Central Asia (10.3%, US$377 million) (**Figure A3 in Appendix**). However, when considering population size, the South Asia, East Asia and Pacific, and sub-Saharan Africa regions received a smaller amount of aid per child compared to the other regions. Notably, sub-Saharan Africa was the only region that experienced a decline in its aid per child from 2020 to 2021, dropping from US$0.8 to US$0.7 (**Table 1**).

ECCE aid by CRS sector

17

The educational sector received the largest share of ECCE aid, totaling US$3,454 million, accounting for 94.7% of the total ECCE aid. It was followed by the social and economic infrastructure sector, which received US$149 million (4.1%), the emergency and humanitarian sector with US$18 million (0.5%), the health sector with US$9 million (0.3%), and other sectors with US$17 million (0.5%). Notably, the social- and economic-infrastructure sector gradually increased its annual share from 2.3% in 2007 (US$2 million) to 10.1% in 2021 (US$57 million) (see **Figure A4 in Appendix**), with the Inter-American Development Bank and the World Bank each contributing US$60 million during the study period.

Within the CRS emergency and humanitarian sector, a total of 149 ECCE projects were funded over the study period. The EU Institutions was the most prominent donor, contributing US$5 million, followed by UNICEF with US$4 million, and the United States with US$2 million. These projects were primarily focused on material-relief assistance and emergency-support services, including the provision of food assistance in ECCE settings, establishing ECCE classes, training teaching personnel for young refugee children, and offering psychosocial support to preschool-aged children in affected areas. However, when comparing the total aid disbursements to the CRS emergency and humanitarian sector across the study period (US$477,047 million), the ECCE projects with humanitarian characteristics (US$18 million) appeared almost negligible.

ECCE aid by implementation channel

Of the 7,977 ECCE projects, 1,976 (24.8%) lack the information of implementation

18

channel, amounting to US$714 million (19.6%) over the study period. Among projects with missing channels, UNICEF contributed 1,851 projects. We replaced missing channel data based on the method mentioned above. For UNICEF, we treated its missing as self-implemented projects. After replacing the missing values, the governments of recipient countries played the most significant role in implementing ECCE aid projects at the ground level, accounting for 60% (US$2,185 million) of total ECCE aid, while NGOs and multilateral organizations represented the second and third largest channels, implementing 20.8% (US$757 million) and 11.8% (US$429 million) of total ECCE aid (**Figure A5 in Appendix**).

ECCE aid by flow type

Throughout the study period, the other official flows, defined as aid transactions with developmental goals but that do not meet the criteria of ODA grants or loans, constituted 41.6% (US$1,516 million) of total ECCE aid. They were followed by ODA grants at 31.7% (US$1,156 million), ODA loans at 14.2% (US$518 million), and private development finance at 12.5% (US$456 million). By country-income groups, ODA grants and loans accounted for the largest proportion of funds allocated to low-income and lower-middle-income countries, representing 81.5% and 74.5%, respectively. In contrast, 76.9% of the total ECCE aid for upper-middle-income countries was in the form of other official flows. It is noteworthy that private developmental finance steadily increased since 2013, culminating in 25.4% (US$143 million) of the ECCE aid in 2021 (**Figure A6 in Appendix**).

ECCE aid by donor

Over the span of 15 years, a total of 76 donors allocated ECCE aid. The World Bank was the leading donor with a cumulative aid disbursement of US$1,944 million, accounting for 53.3% of the total ECCE aid disbursed by all donors (**Figure 2**). Moreover, the World Bank financed nine out of the ten projects with the largest project values, including a cumulative total of US$215 million to three lower-middle-income countries (Vietnam, Indonesia, and Morocco) and US$603 million to three upper-middle-income countries (Brazil, Turkey, and Mexico) (**Table 2**). Together with the World Bank, the other top five donors contributed 70.1% of the total ECCE aid across the study span. These donors included UNICEF (US$219 million), Inter-American Development Bank (US$153 million), LEGO Foundation (US$146 million), and the EU Institutions (US$95 million).

However, when considering each donor's ECCE aid as a percentage of its total educational aid (DAE) disbursement across the SDG study years (2016-2021), the DAC member countries, on average, allocated only 1.9% of DAE to the ECCE sector. Greece (18.5%) was the sole DAC member country whose allocation exceeded the UNICEF-recommended 10% threshold. In contrast, multilateral institutions allocated an average of 9.3%, with UNICEF leading at 25.6% (**Figure A7 in Appendix**).

ECCE aid by recipient country

Out of the 134 LMICs, 129 received ECCE aid directly from donors, while Grenada, Libya, Saint Lucia, Saint Vincent and the Grenadines, and Suriname obtained ECCE aid through allocations of related regional or bilateral funds. Aggregated across the 15

20

study years, the top ten recipients were middle-income countries, with Brazil leading

with a total receipt of US$394 million. When considering the progress in ECCE aid

per child, before the SDG study years (2007-2015), 52 recipient countries, half of

which were in sub-Saharan Africa, received an average of less than US$0.1. However,

the number decreased to 23 during the SDG study period (2016-2021), with nine sub-

Saharan Africa countries receiving less than US$0.1 (**Figure 3**). See **Table A7 in

Appendix** for each country's yearly ECCE aid per child.

In **Figure 4 and Figure A8 and A9 in Appendix**, we ranked 128 countries with

available data on ECCE enrolment rates in 2020 in decreasing order on the right and

ranked countries' cumulative ECCE aid per child throughout the study period in a

decreasing order on the left. Among the 25 low-income recipient countries in the lists,

only six had a higher rank on the enrolment list compared to their ranking on the aid

list. Notably, Sudan had the largest ranking gap among the six countries, ranking 63rd

in terms of enrolment but 118th in aid. By contrast, Syria represented the other end of

the spectrum, ranking 122nd in terms of enrolment rate but 47th in aid received.

When examining countries' cumulative ECCE aid per child against their percentages

of children developmentally on track, most low-income countries with available data

exhibit both low levels of aid and small percentages, forming a cluster in the bottom

left corner of **Figure 5**.

ECCE aid with COVID-19 activities

ECCE aid allocated to projects with COVID-19 activities totaled US$87 million, with

21

a decrease from US$50 million in 2020 to US$37 million in 2021, representing 11.4% and 6.6% of each year's ECCE aid, respectively. The World Bank contributed the largest amount of ECCE aid to projects encompassing COVID-19 activities, constituting 9.3% (US$46 million) of its total ECCE aid over 2020 and 2021. Notably, the LEGO Foundation allocated US$36.4 million to ECCE projects including COVID-19 activities, accounting for 36.8% of its total ECCE aid over the two years. For recipient countries, Mexico received the largest amount of COVID-19-related ECCE aid, totaling US$40 million, which accounted for 94.1% of its total ECCE aid received during the two years. Panama and Kenya followed, receiving US$6 million and US$4 million, respectively, which represented 89.8% and 37.9% of their respective ECCE aid received during the same period (**Table A8-Table A9 in Appendix**).

ECCE aid to conflict-affected countries

During the 15-year study period, the average ECCE aid per child in conflict-affected countries remained strikingly lower compared to non-conflict-affected countries. Conflict-affected countries received an average of US$0.3 per child, which was only a quarter of what non-conflict-affected countries received (US$1.2 per child). On an annual basis, while non-affected countries saw a consistent increase in aid, conflict-affected countries experienced slower and fluctuating growth. Moreover, ECCE aid for conflict-affected countries was below one-half of the aid allocated for non-conflict-affected countries during the study period, with the lowest being one-tenth and the highest two-fifths. In 2021, aid for the conflict-affected countries was only one-fourth of the aid for non-conflict-affected countries (**Figure A10 in Appendix**).

22

General levels and trends of upper-bound ECCE aid

The upper-bound ECCE aid showed a similar trend pattern to the lower-bound estimates. It totaled US$18,180 million across the 15-year period, with the annual aid spanning from US$664 million (2007) to US$1,990 million (2021). When considering population size, the aid per ECCE-age child increased approximately threefold from US$1.0 (2007) to US$2.8 (2021). See **Appendix Table A10-A13 and Figure A11-A18** for more information on the upper-bound estimates.

DISCUSSION

Using data from the Creditor Reporting System, we systematically estimated ECCE aid allocated to 134 LMICs between 2007 and 2021. The total disbursements for aid projects primarily aimed at supporting ECCE witnessed substantial growth, increasing from US$71 million in 2007 to US$562 million in 2021. However, there was a notable fluctuation between 2010 and 2011, primarily driven by changes in aid disbursements from the World Bank. This encouraging upward trend reflects the continuous efforts of the international donor community to secure young children's essential learning and developmental skills for their lifelong benefits. Nevertheless, despite total ECCE aid reaching US$3,646 million over the 15 years, it still accounted for only 1.7% of the total education aid allocated to 134 LMICs during the study period. This is far below the minimum value of 10% of education aid recommended by UNICEF. This suggests that the ECCE sector remained a very low priority for international donors when compared to other education levels.

23

Of particular concern, for most of the study years, low-income countries received a smaller amount of ECCE aid per child than lower- and upper-middle-income countries. Moreover, the low-income group experienced a decline in ECCE aid per child between 2020 and 2021, while the other two income group countries maintained a steadily increasing trend during the same period. The downward trend in aid reconfirmed the intense challenges faced by low-income countries in obtaining external resources to improve access and quality for their ECCE programs[10]. Furthermore, considering that low-income countries had a much lower ECCE enrolment rate even before the COVID-19 pandemic (21% versus 40% in lower-middle-income countries, and 55% in upper-middle-income countries) and children in these setting may be disproportionately affected by ECCE closures caused by the pandemic[7], it remains fundamental to increase ECCE aid to enhance children's early learning opportunities in these resource-limited settings. It is particularly important to address the problem that countries in the most need receive the least funding (e.g., countries with small percentages of young children developmentally on track received small amounts of ECCE aid).

While many LMICs locked down their ECCE as an early response to curb the spread of the COVID-19 virus, we did not observe any increase in subsequent ECCE aid disbursements to mitigate the negative impacts of the closure. Recent evidence indicates that the closure of ECCE programs in 196 countries between 2020 and 2021 may result in a potential loss of 19 billion person-days of ECCE instruction and a total of 11 million additional children are estimated to have fallen "off track" in their learning and development[7]. Such losses create a cycle of cumulative disadvantage for

24

large numbers of children in the poorest countries. Ensuring that children have stable access to quality ECCE services even during global crises should be an essential part of the United Nation's quality education agenda. To achieve this goal, more aid allocations should be made toward basic infrastructure and worker/teacher training for ECCE. Previous studies[45] have identified that the deficiencies in access to basic sanitation and hygiene facilities were the two conditions that made young children vulnerable to infectious diseases in household settings. Although there is limited research on the crisis preparedness at ECCE settings, donors should consider allocations to equip ECCE with adequate infrastructure in hygiene, sanitation, and remote learning, in future aid projects. Also, ensuring an adequate number of capable ECCE workers/teachers is essential for delivering quality at scale[46]. However, during the study period, we only observed US$493 million disbursements (13.5% of the total ECCE disbursements) with teacher-training components. The full potential of ECCE aid in building an ECCE system resilient against global crises cannot be realized unless donors integrate a strong teacher training and support component into aid projects.

Furthermore, our study unveiled a concerning trend in ECCE aid to conflict-affected countries and underscored a significant gap in integrating ECCE education into the emergency and humanitarian aid spectrum. Exposure to armed conflict has been extensively researched and is known to hinder early childhood development[35-37]. It has been estimated that five consecutive years of exposure to armed conflict can lead to a 10.4% decrease in the probability of a child being developmentally on track[37]. Despite this clear evidence, our study found that ECCE aid in conflict-affected countries was only a quarter of that in non-conflict-affected countries. This indicates a

25

significant opportunity for international donors to keep contributing to the goal of universal access to ECCE by 2030 through increased investments in children left behind in conflict-affected settings. Furthermore, we observed that ECCE was largely ignored in the profile of donor's humanitarian aid projects. Given that many emergencies reflect underlying crises in development facing developing countries[47], we strongly call for donors to shift their humanitarian aid philosophy from the United Nation's definition of "life-saving" to "quality life-saving" and place greater emphasis on mitigating the toxic stress on children through ECCE programs in the design of humanitarian aid.

Our study has limitations. First, due to limited information, we did not include ECCE aid contributed by some major emerging economies, such as China and Brazil, as well as by some private entities (e.g., NGOs and private foundations) that did not report to CRS. It has been shown that NGOs and private foundations have been playing important roles in financing ECCE. Our estimates show that they have significantly increased ECCE aid from US$24 million in 2016 to US$143 million in 2021. Second, the keyword-search strategy could not capture all projects on ECCE aid because of either the imperfect sensitivity of the strategy or typos and errors in project descriptions reported by donors. However, our validation test estimated that the keyword search strategy probably missed about 2.6% of projects (0.04% of funds), indicating that our findings are robust. Third, our allocation strategies in the upper-bound estimates lack sufficient empirical evidence. Due to limited information at the activity level, we allocated aid to a country's ECCE sector by multiplying project values by the country's percentage of ECCE-age population. Aid from projects involving both ECCE and non-educational activities was not allocated. This approach

26

may introduce bias, either due to a country's skewed investment in education beyond ECCE or a biased estimation of the ECCE-age population size, for instance, in cases of international migration due to conflicts.

Despite these limitations, the findings of this study represent the first systematic attempts to study ECCE aid in LMICs; and we were able to include 134 LMICs in this study (between 2007 and 2021). We note three key lessons to be drawn from this study. First, given the firm evidence that investing in ECCE is a highly effective approach to ease children's burden caused by disadvantaged contexts[10,48,49], the necessity of prioritizing ECCE in the educational financing framework should be clearly advocated to the international donor community. Though ECCE aid disbursements increased throughout our study period, low-income countries received a much smaller amount than their richer counterparts and experienced a decline in funds from 2020 to 2021. International donors should adjust their preferences and allocate more resources to support ECCE services in the most resource-limited settings.

Second, there had been a decline in ECCE aid towards projects with COVID-19 activities, reflecting a diminishing effort in preparing children for the current and further global crises. Given the unaffordable losses in children's development potential due to ECCE program closures[7], the donor community should innovate their funding mechanisms by emphasizing activities aimed at mitigating the adverse impact of infectious disease epidemics and making ECCE programs well-prepared for the future challenges, like the looming climate crisis.

27

Third, conflict-affected countries received much less investment compared to more-stable countries. While donors may prioritize providing aid in countries with stable political and socioeconomic environments, it is crucial to acknowledge the peacebuilding role of ECCE programs in protecting human and social capital for future development[50]. Therefore, we strongly urge donors to significantly increase their ECCE aid in such settings to enhance children's resilience and contribute to addressing the underlying developmental challenges in unstable situations.

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Data availability
The main data source used in this research come from the Creditor Reporting System (https://stats.oecd.org/Index.aspx?DataSetCode=crs1). A publicly accessible database managed by OECD.

Competing interests
The authors declare no competing interests.

Ethical approval
This article does not contain any studies with human participants performed by any of the authors.

Informed consent

This article does not contain any studies with human participants performed by any of the authors.

Figure 1. Annual ECCE aid and as percentage of development assistance to education (DAE), 2007-2021
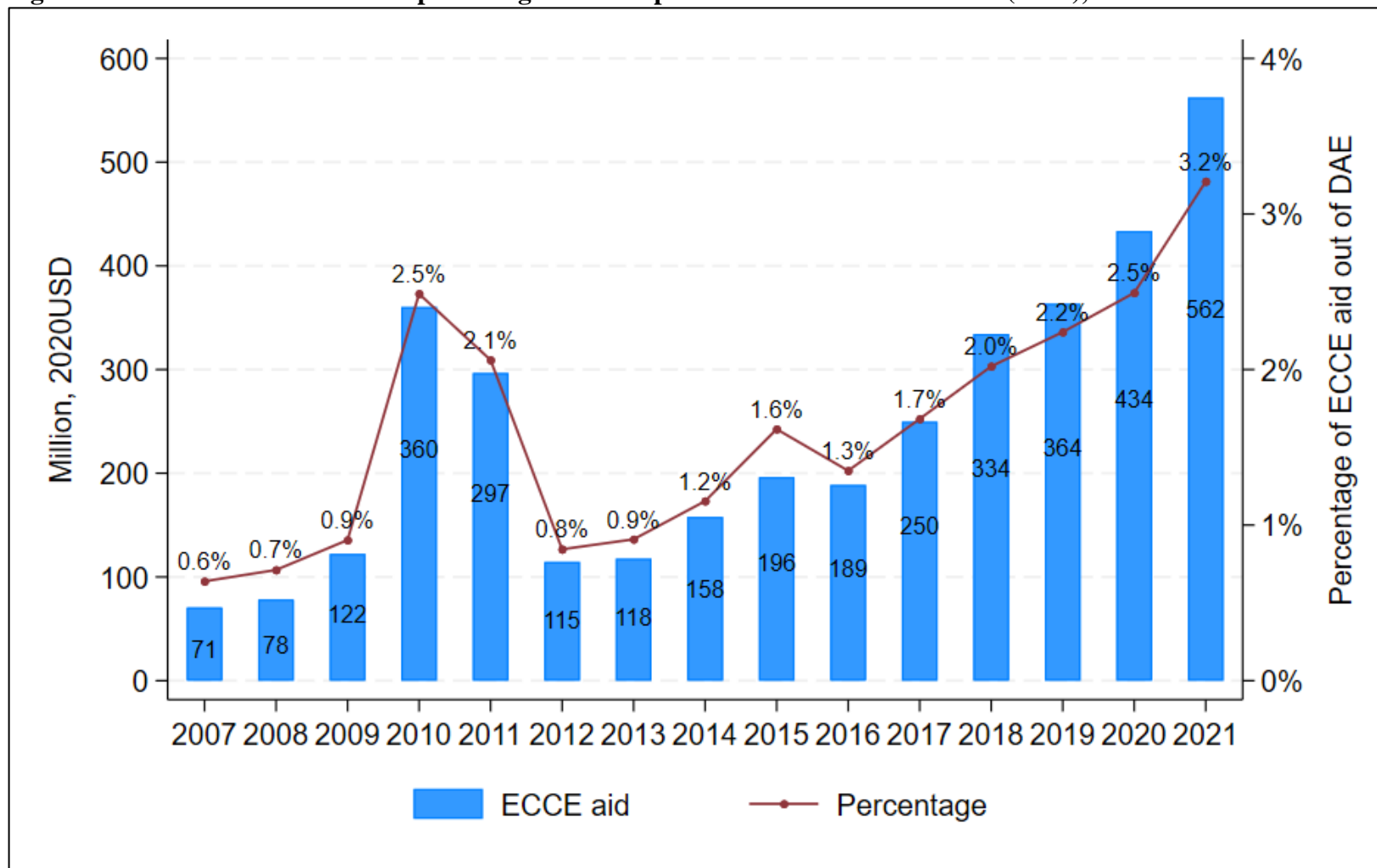
Data source: Our estimates of the lower-bound ECCE aid.

Figure 2. Annual ECCE aid by top 10 and other donors, 2007-2021

Legend:
- World Bank(IBRD/IDA)
- UNICEF
- LEGO Foundation
- Inter-American Development Bank
- EU Institutions
- John D. & Catherine T. MacArthur Foundation
- Netherlands
- Canada
- Italy
- South Korea
- Other donors
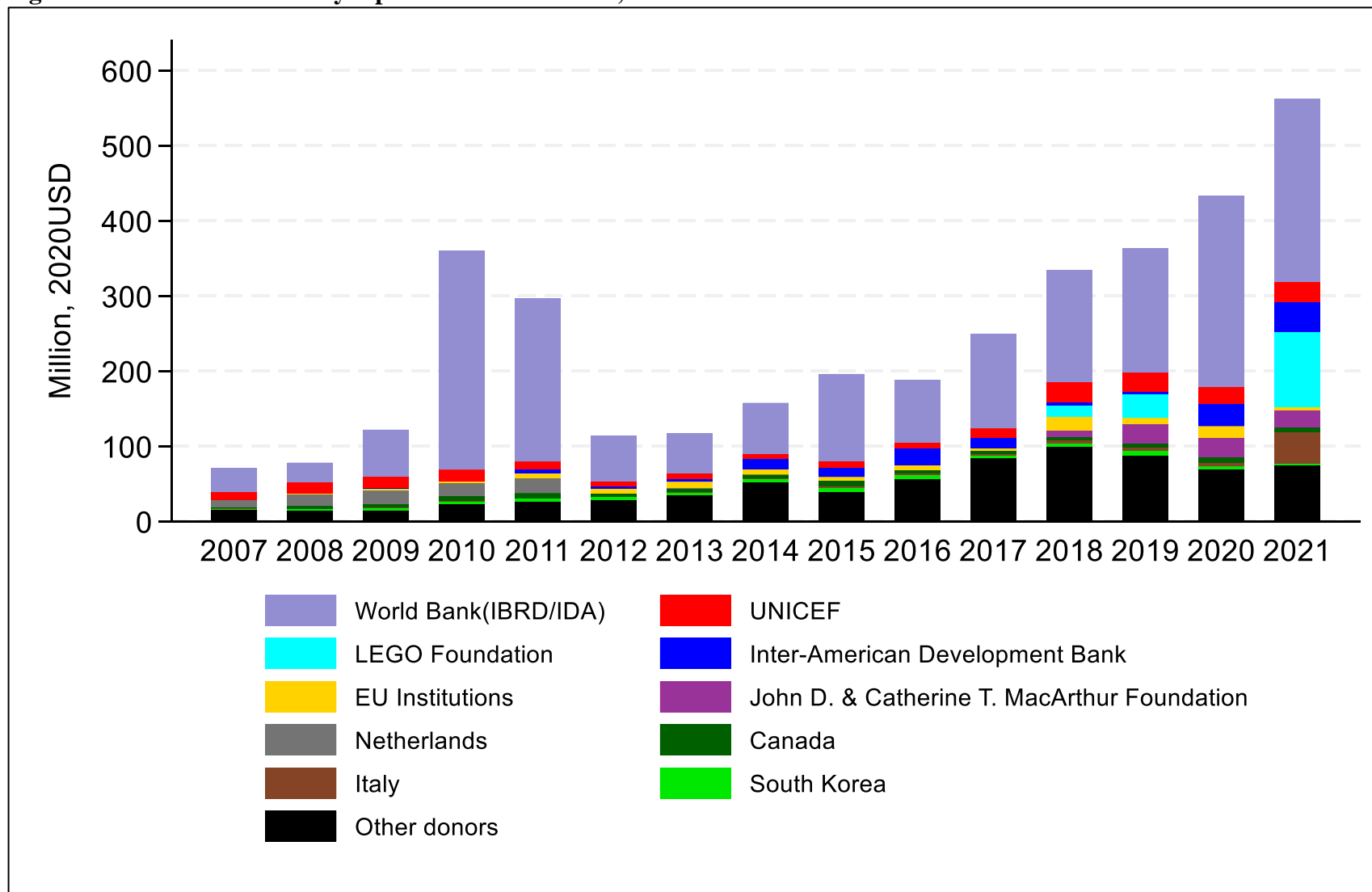
Data source: Our estimates of the lower-bound ECCE aid.

Figure 3. Average ECCE aid per child by year group (2007-2015 versus 2016-2021)

Data source: Our estimates of the lower-bound ECCE aid.

Figure 4. Low-income countries' match between ranks in ECCE aid per child and enrolment rate

Cumulative ECCE aid per child (2007-21)

Tuvalu 1
Montenegro 2
Timor-Leste 3
Namibia 4
Kiribati 5
Jordan 6
Marshall Islands 7
Serbia 8
West Bank and Gaza 9
Georgia 10
Fiji 11
Mongolia 12
Samoa 13
Vanuatu 14
Moldova 15
Liberia 16
North Macedonia 17
São Tomé and Príncipe 18
Armenia 19
Guyana 20
Rwanda 21
Dominican Republic 22
Turkey 23
Lao 24
Jamaica 25
Peru 26
Morocco 27
Argentina 28
Albania 29
Belize 30
Tonga 31
Gambia 32
Nicaragua 33
Mexico 34
Bhutan 35
Brazil 36
Bosnia and Herzegovina 37
Sri Lanka 38
Eswatini 39
Panama 40
Solomon Islands 41
Nepal 42
Bolivia 43
Micronesia 44
Vietnam 45
Djibouti 46
Syrian 47
El Salvador 48
Ecuador 49
Guinea-Bissau 50
Cabo Verde 51
Honduras 52
Iraq 53
Zambia 54
Senegal 55
Tanzania 56
Paraguay 57
Cambodia 58
Dominica 59
Ghana 60
Benin 61
Myanmar 62
Kyrgyzstan 63
Bangladesh 64
Kenya 65
Ukraine 66
Sierra Leone 67
Burkina Faso 68
Costa Rica 69
Pakistan 70
Colombia 71
Uganda 72
Egypt 73
Indonesia 74
Côte d'Ivoire 75
Lesotho 76
Azerbaijan 77
Guinea 78
Malawi 79
South Africa 80
Guatemala 81
Maldives 82
Mali 83
Ethiopia 84
Tunisia 85
Cuba 86
Cameroon 87
Botswana 88
Papua New Guinea 89
Mauritania 90
Belarus 91
Gabon 92
Zimbabwe 93
Uzbekistan 94
Afghanistan 95
Madagascar 96
South Sudan 97
Central African Republic 98
Somalia 99
Togo 100
Turkmenistan 101
Philippines 102
Burundi 103
Comoros 104
Tajikistan 105
Eritrea 106
Niger 107
CongoDR 108
Mauritius 109
Congo 110
Kazakhstan 111
China 112
Nigeria 113
Chad 114
Equatorial Guinea 115
Angola 116
Algeria 117
Sudan 118
Yemen 119
India 120
Venezuela 121
Iran 122
St. Lucia 125
St. Vincent and the Grenadines 124
Grenada 123
Thailand 126
Malaysia 127
Suriname 128

ECCE gross enrolment rate (2020)

1 Grenada
2 Liberia
3 Ghana
4 St. Vincent and the Grenadines
5 Nepal
6 Peru
7 Vanuatu
8 Mauritius
9 Belarus
10 Cuba
11 Costa Rica
12 Malaysia
13 Georgia
14 Moldova
15 Solomon Islands
16 Vietnam
17 Jamaica
18 China
19 Philippines
20 Kiribati
21 Suriname
22 Brazil
23 Colombia
24 Mongolia
25 Ukraine
26 Malawi
27 Pakistan
28 Algeria
29 Tuvalu
30 Bolivia
31 Tanzania
32 Montenegro
33 St. Lucia
34 Argentina
35 Maldives
36 Dominica
37 Thailand
38 Albania
39 Cabo Verde
40 Kazakhstan
41 Zimbabwe
42 Iran
43 Sri Lanka
44 Mexico
45 Venezuela
46 Nicaragua
47 Marshall Islands
48 Serbia
49 El Salvador
50 Kenya
51 Indonesia
52 Guyana
53 India
54 Morocco
55 West Bank and Gaza
56 Dominican Republic
57 Ecuador
58 Paraguay
59 São Tomé and Príncipe
60 Lao
61 Tonga
62 Guatemala
63 Sudan
64 Belize
65 Armenia
66 Papua New Guinea
67 Bangladesh
68 Azerbaijan
69 Tunisia
70 Gambia
71 Equatorial Guinea
72 Gabon
73 Uzbekistan
74 Kyrgyzstan
75 Samoa
76 Madagascar
77 Turkey
78 Angola
79 Honduras
80 Turkmenistan
81 Cameroon
82 Namibia
83 Fiji
84 Ethiopia
85 Lesotho
86 Bhutan
87 Jordan
88 North Macedonia
89 Eswatini
90 Togo
91 Egypt
92 Timor-Leste
93 Rwanda
94 Cambodia
95 Bosnia and Herzegovina
96 Panama
97 Eritrea
98 Nigeria
99 Benin
100 Comoros
101 Botswana
102 Sierra Leone
103 Guinea
104 South Africa
105 Senegal
106 Burundi
107 Uganda
108 Congo
109 Guinea-Bissau
110 South Sudan
111 Côte d'Ivoire
112 Mauritania
113 Djibouti
114 Tajikistan
115 Zambia
116 Myanmar
117 Mali
118 Niger
119 CongoDR
120 Burkina Faso
121 Micronesia
122 Syrian
123 Iraq
124 Central African Republic
125 Yemen
126 Chad
127 Afghanistan
128 Somalia

Low-income countries match

- 🔴 Low-income countries
- 🔵 Lower-middle-income countries
- 🟢 Upper-middle-income countries

Data source: UNESCO. Institute for Statistics. School enrollment, preprimary (% gross). Our estimates of the lower-bound ECCE aid per child.

Figure 5. Cumulative ECCE aid per child versus the percentage of young children (36-59 months) developmentally on track

Data source: UNICEF. Early childhood development – development status. Percentage of children on track in development status measured by ECDI. Our estimates of the lower-bound ECCE aid per child.

Table 1. ECCE aid per ECCE-age child by recipient country region and income group, 2007-2021

Category	Number of countries	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average	Annual growth rate (%)
Global	134	0.1	0.1	0.2	0.5	0.4	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.8	0.4	15.3%
Income group																		
LICs	27	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.5	0.4	0.8	0.6	0.2	18.7%
LMs	55	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.6	0.2	15.4%
UMs	52	0.2	0.1	0.3	1.4	1.1	0.3	0.2	0.2	0.5	0.3	0.7	0.8	0.7	1.0	1.3	0.6	15.0%
Region																		
East Asia and Pacific	22	0.1	0.1	0.2	0.3	0.1	0.1	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2	9.7%
Europe and central Asia	18	0.4	0.1	0.1	6.7	4.0	0.2	0.3	0.4	0.4	0.2	0.6	0.6	0.9	0.7	1.7	1.1	11.5%
Latin America and the Caribbean	26	0.5	0.3	0.9	2.3	2.4	0.9	0.5	0.6	1.5	1.1	1.5	1.7	1.0	1.8	2.0	1.3	10.9%
Middle east and north Africa	13	0.2	0.2	0.3	0.2	0.6	0.1	0.1	0.1	0.1	0.2	0.8	0.7	1.4	1.3	2.9	0.6	22.6%
South Asia	8	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.2	0.3	0.1	19.1%
Sub-Saharan Africa	47	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.5	0.5	0.8	0.7	0.3	18.4%

Note: Annual growth rate = (ECCE aid_2021 / ECCE aid_2007) ^ (1/14) – 1

Table 2. Top 10 ECCE aid projects with the largest aid disbursements

Project title	ECCE activity	Disbursement (US$, million)	Recipient (income group)	Donor
Rio de Janeiro municipality fiscal consolidation for efficiency and growth DPL	Operate ten preschool programs to target low-income neighborhoods	177.7	Brazil (UM)	World Bank
Restoring equitable growth and employment programmatic development policy loan	Hire 15,000 new preschool teachers and launch universal preschool education in 32 provinces	138.6	Turkey (UM)	World Bank
School readiness promotion project	Raise school readiness for 5-year-old children for those most vulnerable to failing in a school environment	86.8	Vietnam (LM)	World Bank
Mexico school-based management project	Reduce drop-out, repetition, and failure rates among participating schools through the improvement of early childhood education	81.0	Mexico (UM)	World Bank
Second restoring equitable growth and employment programmatic development policy loan	Expansion of preschool education to 25 provinces	80.6	Turkey (UM)	World Bank
Program to support the national early childhood plan and the policy for universalization of early childhood education	Universalization of early childhood education	67.2	Argentina (UM)	Inter-American Development Bank
Early childhood education and development project	Prepare poor children for primary school through an integrated early childhood education and development system	65.0	Indonesia (LM)	World Bank
Recife swap education and public management	Expand coverage of improved early child education and create conditions more conducive to learning in fundamental education	64.7	Brazil (UM)	World Bank
Improving early childhood development outcomes in rural Morocco	Improve access to quality early childhood development services, including early childhood education, in rural areas	63.6	Morocco (LM)	World Bank
Reducing inequality of educational opportunity project	Support to build capacity of early childhood education facilitators, supervisors, and coordinators.	60.4	Mexico (UM)	World Bank

Note: LM = lower-middle-income country; UM = upper-middle-income country

APPENDIX

Global development assistance for early childhood care and education in 134 low- and middle-income countries, 2007-2021

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2

Table A1. 134 low- and middle-income recipient countries included in this study

Low-income countries (27):

Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Democratic People's Republic of Korea, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Syria, Togo, Uganda, Yemen

Lower-middle-income countries (55):

Algeria, Angola, Bangladesh, Belize, Benin, Bhutan, Bolivia, Cabo Verde, Cambodia, Cameroon, Comoros, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eswatini, Ghana, Haiti, Honduras, India, Indonesia, Iran, Kenya, Kiribati, Kyrgyzstan, Lao, Lesotho, Mauritania, Micronesia, Mongolia, Morocco, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Senegal, Solomon Islands, Sri Lanka, São Tomé and Principe, Tajikistan, Tanzania, Timor-Leste, Tunisia, Ukraine, Uzbekistan, Vanuatu, Vietnam, West Bank and Gaza, Zambia, Zimbabwe

Upper-middle-income countries (52):

Albania, Argentina, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Botswana, Brazil, China, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Equatorial Guinea, Fiji, Gabon, Georgia, Grenada, Guatemala, Guyana, Iraq, Jamaica, Jordan, Kazakhstan, Kosovo, Lebanon, Libya, Malaysia, Maldives, Marshall Islands, Mauritius, Mexico, Moldova, Montenegro, Namibia, North Macedonia, Panama, Paraguay, Peru, Serbia, South Africa, St. Lucia, St. Vincent and the Grenadines, Suriname, Thailand, Tonga, Turkey, Turkmenistan, Tuvalu, Venezuela

Recipient countries excluded (21):

Anguilla[†], Antigua and Barbuda[⫽], Barbados[⫽], Chile[⫽], Cook Islands[†], Croatia[⫽], Mayotte[†], Montserrat[†], Nauru[⫽], Niue[†], Oman[⫽], Palau[⫽], Saint Helena[†], Saudi Arabia[⫽], Seychelles[⫽], St. Kitts and Nevis[⫽], Tokelau[†], Trinidad and Tobago[⫽], Turks and Caicos Islands[⫽], Uruguay[⫽], Wallis and Futuna[†]

†. No World Bank 2020 income classification[1].
⫽. Categorized as high-income according to World Bank 2020 income classification.

Reference:

1. World Bank. World Bank Country Lending Groups. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. (Accessed date: May 2, 2022)

3

Table A2a. OECD-DAC country donors and years with available data on aid to 134 LMICs between 2007 and 2021

Donor	Year with available aid data	Donor	Year with available aid data
Australia	2007-2021	Japan	2007-2021
Austria	2007-2021	Korea	2007-2021
Belgium	2007-2021	Lithuania	2014-2021
Canada	2007-2021	Luxembourg	2007-2021
Czech Republic	2011-2021	Netherlands	2007-2021
Denmark	2007-2021	New Zealand	2007-2021
Estonia	2013-2021	Norway	2007-2021
EU Institutions	2007-2021	Poland	2013-2021
Finland	2007-2021	Portugal	2007-2021
France	2007-2021	Slovak Republic	2013-2021
Germany	2007-2021	Slovenia	2010-2021
Greece	2007-2021	Spain	2007-2021
Hungary	2014-2021	Sweden	2007-2021
Iceland	2011-2021	Switzerland	2007-2021
Ireland	2007-2021	United Kingdom	2007-2021
Italy	2007-2021	United States	2007-2021

Table A2b. Non-OECD-DAC country donors and years with available data on aid to 134 LMICs between 2007 and 2021

Donor	Year with available aid data	Donor	Year with available aid data
Azerbaijan	2014-2020	Malta	2015-2021
Bulgaria	2015-2021	Monaco	2021
Chinese Taipei	2015-2021	Qatar	2019-2021
Croatia	2014-2021	Romania	2014-2021
Cyprus	2014-2015, 2018-2021	Saudi Arabia	2015-2021
Israel	2015-2021	Thailand	2015-2021
Kazakhstan	2013-2021	Timor-Leste	2014-2015
Kuwait	2010-2021	Turkey	2015-2021
Latvia	2015-2021	United Arab Emirates	2009-2021
Liechtenstein	2015-2021		

Table A2c. Multilateral donors and years with available data on aid to 134 LMICs between 2007 and 2021

Donor	Year with available aid data	Donor	Year with available aid data
Adaptation Fund	2010-2021	International Development Association	2007-2021
African Development Bank	2007-2021	International Finance Corporation	2012-2021
African Development Fund	2007-2021	International Investment Bank	2019-2021
Arab Bank for Economic Development in Africa	2011-2015, 2019-2020	International Labour Organization	2012-2021
Arab Fund (AFESD)	2008-2021	Islamic Development Bank	2007-2021
Asian Development Bank	2007-2021	Montreal Protocol	2015
Asian Infrastructure Investment Bank	2016-2021	New Development Bank	2021
Black Sea Trade & Development Bank	2020-2021	Nordic Development Fund	2009-2021
Caribbean Development Bank	2015-2021	North American Development Bank	2021
Center of Excellence in Finance	2016-2019	OPEC Fund for International Development	2009-2021
Central American Bank for Economic Integration	2020-2021	OSCE	2010-2021
Central Emergency Response Fund	2017-2021	United Nations Conference on Trade and Development	2020-2021
Climate Investment Funds	2012-2021	United Nations Industrial Development Organization	2020-2021
Council of Europe Development Bank	2010-2021	UN Institute for Disarmament Research	2019-2021
Development Bank of Latin America	2017-2021	UN Peacebuilding Fund	2007-2021
European Bank for Reconstruction and Development	2009-2021	UNAIDS	2007-2021
Eurasian Fund for Stabilization and Development	2020-2021	UN Capital Development Fund	2020-2021
Food and Agriculture Organization	2013, 2017-2019, 2021	UNDP	2007-2021
Global Alliance for Vaccines and Immunization	2007-2021	UNECE	2008-2017
Global Environment Facility	2007-2021	UNEP	2015-2016
Global Fund	2007-2021	UNFPA	2007-2021
Global Green Growth Institute	2013-2021	UNHCR	2011-2021
Green Climate Fund	2015-2021	UNICEF	2007-2021
IDB Invest	2016-2021	UNRWA	2007-2021

IFAD	2007-2021	WFP	2008-2021
IMF (Concessional Trust Funds)	2007-2021	World Health Organization	2009-2021
Inter-American Development Bank	2007-2021	World Tourism Organization	2016-2020
International Atomic Energy Agency	2015-2021	WTO - International Trade Centre	2020-2021
International Bank for Reconstruction and Development	2007-2021	WHO-Strategic Preparedness and Response Plan	2021

Table A2d. Private donors and years with available data on aid to 134 LMICs between 2007 and 2021

Donor	Year with available data	Donor	Year with available data
Arcadia Fund	2015-2021	Jacobs Foundation	2016-2021
Arcus Foundation	2015-2021	John D. & Catherine T. MacArthur Foundation	2017-2021
BBVA Microfinance Foundation	2017-2021	La Caixa Banking Foundation	2017-2021
Bernard van Leer Foundation	2017-2021	Laudes Foundation	2013-2021
Bezos Earth Fund	2020-2021	LEGO Foundation	2018-2019, 2021
Bill & Melinda Gates Foundation	2009-2021	Margaret A. Cargill Foundation	2016-2020
Bloomberg Family Foundation	2017-2021	MasterCard Foundation	2017-2021
Botnar Foundation	2017-2020	MAVA Foundation	2013-2021
Carnegie Corporation of New York	2017-2021	McKnight Foundation	2018-2020
Charity Projects Ltd (Comic Relief)	2013-2021	MetLife Foundation	2013-2020
Children's Investment Fund Foundation	2017-2021	Michael & Susan Dell Foundation	2016-2021
Citi Foundation	2017-2021	Norwegian Postcode Lottery	2018-2021
Conrad N. Hilton Foundation	2013-2021	Oak Foundation	2017-2021
David & Lucile Packard Foundation	2017-2021	Omidyar Network Fund, Inc.	2017-2020
Dutch Postcode Lottery	2016-2021	Open Society Foundations	2016-2020
Fondation Botnar	2021	People's Postcode Lottery	2016-2021
Ford Foundation	2017-2021	Rockefeller Foundation	2018-2021
Gatsby Charitable Foundation	2013-2020	Susan T. Buffett Foundation	2017-2020
Gordon and Betty Moore Foundation	2017-2021	Swedish Postcode Lottery	2017-2021
Grameen Crédit Agricole Foundation	2017-2020	UBS Optimus Foundation	2019-2021
H&M Foundation	2013-2021	Wellcome Trust	2017-2021
Howard G. Buffett Foundation	2017-2020	William & Flora Hewlett Foundation	2017-2020
IKEA Foundation	2015-2021	World Diabetes Foundation	2016-2021
International Commission on Missing Persons	2021	German Postcode Lottery	2021

Note:

1. The classification of donor types was based on DAC and CRS code list. https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/dacandcrscodelists.htm (Accessed date: May 3, 2022)

Table A3. CRS sectors used for searching ECCE aid projects

I. *Social Infrastructure and Services: This main category relates essentially to efforts to develop the human resource potential of developing countries.*		II. *Economic Infrastructure and Services: This major heading groups assistance for networks, utilities and services that facilitate economic activity.*	
Sector name	**Sector code**	**Sector name**	**Sector code**
Education	110	Transport & Storage	210
Education, Level Unspecified	111	Communications	220
Basic Education[†]	112	Energy	230
Secondary Education	113	Energy Policy	231
Post-Secondary Education	114	Energy generation, renewable sources	232
Health	120	Energy generation, non-renewable sources	233
Health, General	121	Hybrid energy plants	234
Basic Health	122	Nuclear energy plants	235
Non-communicable diseases (NCDs)	123	Energy distribution	236
Population Policies/Programmes & Reproductive Health	130	Banking & Financial Services	240
Water Supply & Sanitation	140	Business & Other Services	250
Government & Civil Society	150		
Government & Civil Society-general	151		
Conflict, Peace & Security	152		
Other Social Infrastructure & Services	160		
III. *Production Sectors: This main heading groups contributions to all directly productive sectors.*		IV. *Multisector/Cross-Cutting: This main heading includes support for projects which straddle several sectors.*	
Sector name	**Sector code**	**Sector name**	**Sector code**
Agriculture, Forestry, Fishing	310	General Environment Protection	410
Agriculture	311	Other Multisector	430
Forestry	312		
Fishing	313		
Industry, Mining, Construction	320		
Industry	321		
Mineral Resources & Mining	322		
Construction	323		
Trade Policies & Regulations	330		
Trade Policies & Regulations	331		
Tourism	332		
V. *Commodity Aid and General Program Assistance*		VI. *Action Relating to Debt*	

9

Sector name	Sector code	Sector name	Sector code
General Budget Support	510	Action Relating to Debt	600
Development Food Assistance	520		
Other Commodity Assistance	530		
VII. Humanitarian Aid: Humanitarian aid is assistance designed to save lives, alleviate suffering and maintain and protect human dignity during and in the aftermath of emergencies.		*VIII. Administrative Costs of Donors, Refugees in Donor Countries, Unallocated/Unspecified*	
Sector name	Sector code	Sector name	Sector code
Emergency Response	720	Administrative Costs of Donors	910
Reconstruction Relief & Rehabilitation	730	Refugees in Donor Countries	930
Disaster Prevention & Preparedness	740	Unallocated / Unspecified	998

†. We did not apply keyword search to projects reported under the "Early childhood education" purpose of the "Basic Education" sector.

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Table A4a. Keywords used to search for ECCE aid projects

Group 1: ECCE-specific keywords				
0 class	ECCE	Infant educat[†]	PIDI	Ready to learn
Anganwadi	ECD	Infant friendly learn	Play school	Reception class
CCD	ECE	Infant friendly school	Pre-academic	Reception year
Creche	Educa a Tu Hijo[†]	Infant friendly space	Pre-K	Sesame Street
Early brain	EEC	Infant friendly environ	Prekindergarten	Sustainable development goal 4.2
Early care	Grade 0	Infant learn	Preparatory year	Tahderiyyah[†]
Early child program	Grade R	Infant school	Preprimary	Year R
Early develop	ICDS	Kinder Catch-up Education (KCE)	Preschool	
Early educat[†]	Infant care	Kindergarten	PPE	
Early learn	Infant center	Mi Primer Empleo Digno[†]	Proyecto Integral de Desarrollo Infantil[†]	
Early year educat[†]	Infant develop	PEDAKOS[†]	R class	
Group 2: general care/education keywords				
Behavior develop	Child-to-child	Language	Nurturing learn	Psychological
Brain develop	Cognition	Learn and play	Physical develop	Psychosocial
Caring for child	Comprehensive care	Learn habit	Physical exercise	Readiness program
Center-based	Comprehensive develop	Learn opportunit[†]	Physical growth	Role-play
Child and family attention center	Day care	Learn potential	Physical well-being	Safe learn
Child and family care center	Day center	Learn space	Play activit[†]	Satellite center
Child and family center	Drop-in	Learn through play	Play group	Social interact
Child care	Educat[†]	Literacy	Play interact	Stimulation
Child center	Education game	Motor develop	Play-and-learn	Supervised neighborhood play
Child develop	Education television	Motor skill	Play-based	Verbal comprehen[†]
Child educat[†]	Emotion	Neurodevelop	Playful learn	Verbal mean
Child friendly learn	Initial educat[†]	Number concept	Plaything	
Child friendly space	Interactive learn	Nursery	Pre learn	
Child learn	Interactive play	Nurturing care	Pre-read	

Note:

1. We compiled keywords based on literature review listed in the "Reference".
2. We performed search with keywords in English and other major languages: Spanish, French, Portuguese, Italian, Dutch, German, Norwegian, and Swedish.
3. We performed keywords searching using (1) all lower case; (2) all upper case; (3) capitalize the first letter of each word; (4) capitalize the first letter of the term.
4. For terms consisting of two or more words, we also searched in their hyphenated forms, such as "safe-learn", and in the form without space if appliable, such as "childcare" for "child care".
5. For abbreviated keywords, such as ECE, we also searched them with hyphen, slash, parentheses, and space, such as "-ECE", "/ECE", "(ECE)", " ECE ".
†. We truncated words to represent their variant spellings, such as using "educat" to represent "educate", "educated", "education", and "educational".
‡. "Educa a Tu Hijo" is an ECCE program in Cuba; "Mi Primer Empleo Digno" is a public works Project in Bolivia, includes financing a daily stipend equivalent of Bs 500 per woman with children under six to cover daycare for children during training; "PEDAKOS" is an ECCE program in Kosovo; "Proyecto Integral de Desarrollo Infantil" is an ECCE program in Bolivia; "Tahderiyyah" is a preschool program supported by the UNICEF Country Office in the Philippines to reach disadvantaged children in remote.

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Table A4b. Age-related terms

Child	0 to 3	3 to 5	6 month	Age 3
Kid	0 to 4	3 to 6	12 month	Age 4
Boy	0 to 5	3 to 7	24 month	Age 5
Girl	0 to 6	4 to 5	36 month	Age 6
Newborn	0 to 7	4 to 6	48 month	Age 7
Toddler	1 to 2	4 to 7	59 month	Age of 0
Infant	1 to 3	5 to 6	60 month	Age of 1
Infancy	1 to 4	5 to 7	26 week	Age of 2
1 year	1 to 5	6 to 7	52 week	Age of 3
2 year	1 to 6	Under 1	104 week	Age of 4
3 year	1 to 7	Under 2	156 week	Age of 5
4 year	2 to 3	Under 3	208 week	Age of 6
5 year	2 to 4	Under 4	256 week	Age of 7
6 year	2 to 5	Under 5	260 week	
7 year	2 to 6	Under 6	Age 0	
0 to 1	2 to 7	Under 7	Age 1	
0 to 2	3 to 4	0 month	Age 2	

Note:
1. We performed search with keywords in English and other major languages: Spanish, French, Portuguese, Italian, Dutch, German, Norwegian, and Swedish.
2. In addition to searching Arabic numerals, we replaced numbers with words, such as "under five" for "under 5" and searched: (1) all lower case; (2) all upper case; (3) capitalize the first letter of each word; (4) capitalize the first letter of the term.
3. For terms consisting of two or more words, we also searched in their hyphenated forms, such as "age-of-three".

Table A4c. COVID-19 keywords

Pandemic	Covid	Corona virus	Wuhan virus	Wuhan pneumonia
-Ncov	SARS-CoV-2	Mask		

Note:

1. We performed search with keywords in English and other major languages: Spanish, French, Portuguese, Italian, Dutch, German, Norwegian, and Swedish.

2. We performed keywords searching using (1) all lower case; (2) all upper case; (3) capitalize the first letter of each word; (4) capitalize the first letter of the term.

Table A5. Allocation strategies used in this study

Recipient	Project type					
	Projects primarily focused on ECCE	**Projects focused on ECCE and higher-than-ECCE education**	**Projects focused on ECCE and non-education activities**	**Projects focused on childcare or child education without specifying children's age and education level**	**Projects reported under the CRS "Education, level unspecified" sector**	**Projects reported under the CRS "General budget support" sector**
Country	No allocation	Allocated by country-year-specific proportion of ECCE-age population within the population of ECCE and the education level mentioned in the project[1-6]	No allocation	Allocated by country-year-specific proportion of ECCE-age population within the population of ECCE to tertiary education[1-6]	Allocated by country-year-specific proportion of ECCE-age population within the population of ECCE to tertiary education[1-6]	*Step 1:* Allocated to country's education sector by country-year-specific proportion of government spending on education within the total general government spending[7] *Step 2:* Allocated to country's ECCE by country-year-specific proportion of ECCE-age population within the population of ECCE to tertiary education[1-6]
Regional	Allocated to each country in the region by country-year-specific proportion within region's ECCE-age population[1,2]	Allocated to each country in the region by country-year-specific proportion of ECCE-age population within region's population of ECCE and the education level mentioned in the project[1-6]	Allocated to each country in the region by country-year-specific proportion within region's ECCE-age population[1,2]	Allocated to each country in the region by country-year-specific proportion of ECCE-age population within region's population of ECCE to tertiary education[1-6]	Allocated to each country in the region by country-year-specific proportion of ECCE-age population within region's population of ECCE to tertiary education[1-6]	*Step 1:* Allocated to each country in the region by country-year-specific proportion within total population in the region[8] *Step 2:* Allocated to country's education sector by country-year-specific proportion of government spending on education within the total general government spending[7] *Step 3:* Allocated to country's ECCE by country-year-specific proportion of ECCE-age population within the population of ECCE to tertiary education[1-6]
Bilateral	Allocated to each country by country-year-specific proportion within 134 LMICs' ECCE-age population[1,2]	Allocated to each country by country-year-specific proportion of ECCE-age population within 134 LMICs' population of ECCE and the education level mentioned in the project[1-6]	Allocated to each country by country-year-specific proportion within 134 LMICs' ECCE-age population[1,2]	Allocated to each country by country-year-specific proportion of ECCE-age population within 134 LMICs' population of ECCE to tertiary education[1-6]	Allocated to each country by country-year-specific proportion of ECCE-age population within 134 LMICs' population of ECCE to tertiary education[1-6]	*Step 1:* Allocated to each country by country-year-specific proportion within total population in 134 LMICs[8] *Step 2:* Allocated to country's education sector by country-year-specific proportion of government spending on education within the total general government spending[7] *Step 3:* Allocated to country's ECCE by country-year-specific proportion of ECCE-age population within the population of ECCE to tertiary education[1-6]

Note: We imputed missing data for the related population and government spending. See **Text A1 in the Appendix** for detailed information on the imputation.
Data sources:

1. School age population, early childhood educational development programs, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

2. School age population, pre-primary education, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

3. School age population, primary education, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

4. School age population, secondary education, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

5. School age population, post-secondary non-tertiary education, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

6. School age population, tertiary education, both sexes (UNESCO. http://data.uis.unesco.org/# [Accessed date: February 20, 2023])

7. Government expenditure on education, total (% of government expenditure) (World Bank. https://data.worldbank.org/indicator/SE.XPD.TOTL.GB.ZS?view=chart [Accessed date: February 20, 2023])

8. Population, total (World Bank. https://data.worldbank.org/indicator/SP.POP.TOTL?view=chart [Accessed date: February 20, 2023])

Table A6. Conflict-affected countries

28 countries:
Afghanistan, Azerbaijan, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Colombia, Congo DR, Ethiopia, Haiti, Iraq, Libya, Mali, Mozambique, Myanmar, Nepal, Niger, Nigeria, Pakistan, Somalia, South Sudan, Sri Lanka, Sudan, Syria, Uganda, Ukraine, Yemen

17

Table A7. Recipient country's annual lower-bound ECCE aid per ECCE-aged child, 2007-2021 (2020USD)

Recipient country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
Low-income countries (27)																
Afghanistan	0.02	0.03	0.02	0.10	0.37	0.01	0.04	0.10	0.21	0.08	0.07	0.11	0.14	0.18	0.75	0.15
Burkina Faso	0.07	0.14	0.10	0.25	0.39	0.09	0.45	0.37	0.36	0.28	0.21	0.49	0.83	0.37	1.00	0.36
Burundi	0.02	0.08	0.10	0.17	0.07	0.03	0.14	0.09	0.15	0.14	0.15	0.22	0.16	0.11	0.11	0.12
Central African Republic	0.03	0.02	0.02	0.02	0.04	0.12	0.17	0.03	0.02	0.23	0.05	0.16	0.91	0.06	0.11	0.13
Chad	0.04	0.07	0.05	0.02	0.13	0.00	0.01	0.01	0.02	0.04	0.05	0.09	0.06	0.05	0.05	0.05
Congo DR	0.06	0.08	0.10	0.08	0.03	0.04	0.03	0.03	0.02	0.07	0.09	0.15	0.07	0.09	0.13	0.07
Eritrea	0.20	0.04	0.04	0.35	0.17	0.09	0.04	0.01	0.02	0.11	0.05	0.14	0.10	0.04	0.08	0.10
Ethiopia	0.04	0.05	0.06	0.08	0.07	0.05	0.06	0.12	0.11	0.15	0.15	0.58	0.42	0.60	0.56	0.21
Gambia	0.23	0.15	0.10	0.05	0.05	0.30	0.01	0.03	0.02	0.08	0.54	4.88	3.91	9.77	5.41	1.70
Guinea	0.01	0.03	0.07	0.05	0.14	2.40	0.40	0.01	0.02	0.04	0.13	0.17	0.10	0.56	0.19	0.29
Guinea-Bissau	0.01	0.26	0.51	0.03	3.02	0.35	0.92	0.80	0.43	0.06	0.19	1.36	0.74	0.42	0.46	0.64
Korea DP	0.04	0.02	0.01	0.05	0.07	0.00	0.00	0.22	0.15	0.05	0.02	0.03	0.03	0.02	0.03	0.05
Liberia	0.02	0.02	0.03	0.02	0.02	0.00	0.01	0.09	0.29	21.48	0.46	6.02	9.20	6.46	0.27	2.96
Madagascar	0.02	0.10	0.03	0.04	0.01	0.07	0.07	0.08	0.07	0.08	0.09	0.34	0.28	0.35	0.54	0.14
Malawi	0.02	0.08	0.04	0.10	0.08	0.06	0.45	0.30	0.34	0.38	0.44	0.33	0.65	0.48	0.55	0.29
Mali	0.07	0.04	0.09	0.22	0.24	0.22	0.08	0.14	0.09	0.14	0.37	0.42	0.28	0.34	0.44	0.21
Mozambique	0.09	0.11	0.32	0.30	0.29	0.14	0.21	2.82	0.31	0.26	0.44	0.77	0.57	0.71	0.42	0.52
Niger	0.12	0.20	0.19	0.15	0.02	0.01	0.01	0.02	0.07	0.05	0.05	0.23	0.10	0.07	0.07	0.09
Rwanda	0.01	0.07	0.07	0.18	0.01	0.20	0.81	0.36	0.10	0.17	0.71	1.09	1.86	23.57	5.89	2.34
Sierra Leone	0.08	0.06	0.43	0.20	0.02	0.02	0.06	0.01	0.16	0.30	0.22	1.04	0.74	0.20	1.91	0.36
Somalia	0.06	0.02	0.02	0.02	0.00	0.03	0.01	0.01	0.02	0.04	0.08	0.42	0.29	0.35	0.46	0.12
South Sudan					0.00	0.00	0.01	0.01	0.02	0.08	0.05	0.11	0.16	0.22	1.48	0.14
Sudan	0.02	0.02	0.08	0.06	0.00	0.00	0.01	0.01	0.02	0.04	0.05	0.10	0.05	0.05	0.04	0.04
Syria	0.03	0.03	0.02	0.03	0.02	0.01	0.03	0.08	0.10	0.14	0.08	2.81	1.95	3.26	2.68	0.75
Togo	0.07	0.02	0.18	0.17	0.02	0.04	0.05	0.06	0.04	0.07	0.12	0.34	0.22	0.31	0.11	0.12
Uganda	0.14	0.10	0.32	0.17	0.18	0.20	0.48	0.23	0.28	0.43	0.29	0.51	0.30	0.29	1.21	0.34
Yemen	0.03	0.03	0.03	0.03	0.02	0.00	0.02	0.01	0.01	0.02	0.03	0.07	0.10	0.04	0.08	0.03
Lower-middle-income countries (55)																
Algeria	0.01	0.06	0.02	0.19	0.01	0.00	0.00	0.01	0.01	0.03	0.10	0.07	0.07	0.03	0.05	0.04
Angola	0.06	0.02	0.03	0.02	0.00	0.02	0.01	0.02	0.02	0.04	0.05	0.11	0.11	0.07	0.09	0.04
Bangladesh	0.07	0.27	0.20	0.29	0.30	0.31	0.29	0.22	0.07	0.04	0.05	0.30	2.41	0.42	0.59	0.39
Belize	0.42	0.02	0.52	2.81	3.27	0.02	0.01	0.01	14.17	0.03	0.06	1.58	3.38	0.22	0.14	1.78

18

Benin	0.01	0.09	0.07	0.07	0.04	0.03	0.02	0.08	0.11	0.11	0.51	0.37	2.18	1.65	1.26	0.44
Bhutan	0.09	0.07	0.01	0.11	0.64	1.01	1.22	0.01	0.01	0.03	0.99	2.04	11.18	1.88	3.43	1.52
Bolivia	0.28	0.09	0.32	0.44	0.33	0.96	0.64	1.99	0.37	6.47	3.12	0.38	0.44	0.29	0.37	1.10
Cabo Verde	0.01	0.02	0.02	0.02	0.00	0.00	0.47	2.42	0.54	0.26	0.25	1.83	1.00	1.86	0.67	0.63
Cambodia	0.31	0.57	0.32	0.25	0.26	0.18	0.54	0.36	1.00	0.70	0.34	0.66	0.63	0.14	0.65	0.46
Cameroon	0.04	0.04	0.12	0.11	0.02	0.03	0.02	0.02	0.03	0.05	0.07	0.24	0.58	0.27	1.32	0.20
Comoros	0.04	0.03	0.13	0.10	0.05	0.00	0.01	0.01	0.02	0.04	0.19	0.21	0.08	0.15	0.54	0.11
Congo	0.01	0.02	0.06	0.19	0.02	0.00	0.06	0.01	0.02	0.04	0.05	0.22	0.17	0.04	0.04	0.06
Côte d'Ivoire	0.02	0.06	0.12	0.18	0.03	0.01	0.06	0.04	0.07	0.08	0.82	0.66	1.20	0.90	0.14	0.29
Djibouti	0.01	0.53	0.24	0.02	1.38	1.86	1.79	0.08	1.27	0.24	0.09	0.74	0.18	1.18	3.02	0.84
Egypt	0.20	0.39	0.67	0.25	0.42	0.32	0.32	0.23	0.01	0.03	0.10	0.88	0.62	0.28	0.11	0.32
El Salvador	0.02	0.27	0.16	1.20	0.28	0.75	0.08	0.07	0.13	0.82	0.53	1.29	1.56	0.87	2.17	0.68
Eswatini	1.07	0.02	0.02	0.02	0.36	1.74	1.42	1.11	2.99	3.89	2.94	0.91	1.12	0.73	0.73	1.27
Ghana	0.56	0.21	0.08	0.13	0.03	0.10	0.05	0.09	0.13	0.16	0.14	0.39	0.81	2.64	1.20	0.45
Haiti	0.54	0.03	0.41	0.11	0.03	0.05	0.03	0.13	0.05	0.05	0.31	0.08	0.20	0.25	2.74	0.34
Honduras	2.30	0.04	0.06	0.60	0.37	1.53	1.38	0.36	0.18	0.17	0.19	0.28	0.21	0.37	0.94	0.60
India	0.01	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.04	0.08	0.07	0.08	0.05	0.09	0.03
Indonesia	0.18	0.46	0.82	1.47	0.36	0.23	0.11	0.04	0.03	0.08	0.08	0.10	0.16	0.29	0.17	0.31
Iran	0.02	0.03	0.02	0.02	0.00	0.00	0.03	0.01	0.01	0.03	0.03	0.07	0.10	0.04	0.04	0.03
Kenya	0.06	0.13	0.04	0.07	0.08	0.06	0.29	0.67	0.44	0.30	0.93	0.79	0.49	0.39	0.83	0.37
Kiribati	0.03	0.02	0.08	0.06	0.00	3.10	0.00	4.47	0.05	0.18	30.57	46.37	18.65	0.29	5.98	7.32
Kyrgyzstan	0.04	0.11	0.09	0.07	0.00	0.08	0.50	0.17	0.37	0.23	0.11	0.16	0.66	1.42	2.00	0.40
Lao	0.11	0.20	0.25	0.19	0.16	0.12	0.18	1.68	5.78	4.06	3.48	7.93	2.95	2.72	0.44	2.02
Lesotho	0.02	0.02	0.02	0.03	0.00	0.00	0.23	0.18	0.20	0.32	0.51	0.41	0.80	0.57	1.08	0.29
Mauritania	0.07	0.13	0.10	0.11	0.07	0.02	0.01	0.02	0.18	0.12	0.08	0.68	0.55	0.43	0.33	0.19
Micronesia	0.03	0.02	0.08	0.06	0.00	0.00	0.00	0.01	0.05	12.60	0.34	0.49	0.65	0.13	0.59	1.00
Mongolia	0.21	2.00	1.44	1.22	6.00	5.01	4.27	3.74	5.53	6.49	2.88	2.87	1.89	2.10	3.41	3.27
Morocco	0.73	0.20	0.56	0.29	0.17	0.12	0.17	0.10	0.19	0.22	0.14	0.41	3.93	2.28	19.68	1.95
Myanmar	0.52	0.37	0.18	0.13	0.23	0.63	0.37	0.19	0.16	0.93	0.59	0.76	0.36	0.32	0.41	0.41
Nepal	0.08	0.12	0.40	0.13	0.14	2.77	2.70	3.38	3.85	1.47	0.17	0.40	0.21	0.17	0.62	1.11
Nicaragua	1.75	0.81	1.31	1.84	7.54	0.67	0.52	0.20	0.12	0.23	1.26	0.76	1.13	3.23	2.96	1.62
Nigeria	0.02	0.05	0.05	0.06	0.03	0.01	0.02	0.02	0.02	0.04	0.05	0.12	0.08	0.07	0.14	0.05
Pakistan	0.07	0.17	0.13	0.24	0.42	0.33	0.23	0.24	0.02	0.50	0.19	0.65	0.73	0.46	0.87	0.35
Papua New Guinea	0.03	0.02	0.08	0.06	0.02	0.00	0.00	0.01	0.09	0.06	0.44	0.52	0.65	0.13	0.79	0.19
Philippines	0.01	0.02	0.03	0.21	0.03	0.26	0.03	0.36	0.03	0.06	0.51	0.06	0.06	0.04	0.06	0.12

19

Samoa	0.03	0.02	0.08	0.06	0.00	0.00	3.58	0.01	2.74	0.49	1.11	0.49	0.65	0.13	38.07	3.16
Senegal	0.42	0.23	0.29	0.25	0.24	0.29	0.28	0.32	0.26	0.40	0.20	0.40	1.51	1.22	1.78	0.54
Solomon Islands	0.03	0.02	0.08	0.06	1.00	0.00	0.00	3.93	3.86	0.06	1.93	1.33	1.75	0.90	2.75	1.18
Sri Lanka	0.07	0.66	0.06	0.47	0.68	0.09	0.14	0.38	0.29	1.06	2.31	3.66	3.35	4.65	1.98	1.32
São Tomé and Principe	0.01	0.48	0.02	0.18	0.09	0.48	3.40	2.09	19.75	0.31	0.49	0.42	2.28	0.91	5.28	2.41
Tajikistan	0.03	0.10	0.04	0.02	0.08	0.01	0.16	0.11	0.13	0.09	0.12	0.05	0.07	0.23	0.33	0.11
Tanzania	0.08	0.11	0.19	0.11	0.07	0.07	0.19	0.18	0.28	0.47	0.38	0.42	0.33	2.17	2.83	0.52
Timor-Leste	0.61	0.70	1.32	1.71	1.70	1.50	2.25	15.79	14.78	16.15	18.45	22.70	19.62	16.60	15.52	9.96
Tunisia	0.03	0.04	0.04	0.19	0.09	0.03	0.00	0.01	0.02	0.14	0.26	0.21	0.76	0.56	0.61	0.20
Ukraine	0.01	0.03	0.07	0.08	0.03	0.26	0.16	0.20	0.16	0.10	0.09	0.25	1.11	0.35	2.61	0.37
Uzbekistan	0.06	0.08	0.03	0.07	0.01	0.13	0.12	0.06	0.07	0.08	0.07	0.08	0.17	0.34	0.92	0.15
Vanuatu	0.03	3.83	0.08	2.01	1.84	1.38	4.04	6.32	1.42	7.91	3.38	5.82	5.95	0.13	2.29	3.09
Vietnam	0.10	0.26	0.06	0.05	0.05	0.19	2.58	3.40	3.44	1.19	1.31	0.35	0.50	0.31	0.55	0.95
West Bank and Gaza	0.90	1.67	1.99	1.94	25.59	0.92	0.59	2.46	1.55	2.39	2.97	3.30	2.34	8.48	1.85	3.93
Zambia	0.07	0.13	0.10	0.11	0.35	0.22	0.68	0.69	0.56	0.66	0.78	0.77	0.91	0.74	1.45	0.55
Zimbabwe	0.01	0.11	0.08	0.02	0.04	0.20	0.01	0.28	0.02	0.07	0.34	0.33	0.31	0.32	0.33	0.16
Upper-middle-income countries (52)																
Albania	2.06	0.07	0.16	0.22	0.03	0.08	1.39	0.78	0.45	0.10	0.78	4.51	3.55	5.86	8.19	1.88
Argentina	0.98	0.79	1.39	1.51	1.51	2.09	0.74	0.01	0.39	0.41	0.49	1.53	1.54	6.32	9.08	1.92
Armenia	0.07	0.11	0.31	0.02	5.64	0.00	0.31	0.06	2.28	2.98	3.65	2.79	5.73	6.59	5.47	2.40
Azerbaijan	0.01	0.01	0.09	1.34	0.09	0.44	0.51	0.21	0.10	0.37	0.13	0.32	0.30	0.13	0.31	0.29
Belarus	0.11	0.01	0.03	0.17	0.03	0.07	0.20	0.23	0.09	0.14	0.50	0.15	0.36	0.40	0.25	0.18
Bosnia and Herzegovina	0.12	1.12	0.81	0.09	2.00	0.38	1.62	0.41	0.30	0.72	0.92	3.35	2.94	2.47	3.60	1.39
Botswana	0.05	0.02	0.02	0.02	0.00	0.00	0.01	0.35	0.38	0.80	0.24	0.64	0.27	0.08	0.05	0.20
Brazil	0.02	0.05	1.40	6.19	5.86	1.20	0.57	0.87	0.71	0.97	0.90	1.17	1.51	1.09	0.16	1.51
China	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.03	0.03	0.17	0.12	0.19	0.20	0.06
Colombia	0.01	0.05	0.22	0.16	0.12	0.28	0.24	0.09	0.13	0.10	0.55	0.63	0.49	0.64	1.56	0.35
Costa Rica	0.02	0.02	0.03	0.06	0.41	1.11	1.12	0.21	0.17	0.07	0.13	0.39	0.37	0.55	0.73	0.36
Cuba	0.26	0.25	1.14	0.15	0.11	0.02	0.02	0.11	0.11	0.26	0.17	0.13	0.14	0.05	0.03	0.20
Dominica	0.02	0.02	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.03	0.06	0.05	0.04	0.04	6.34	0.45
Dominican Republic	5.26	5.43	5.67	7.11	4.44	0.14	0.13	0.14	0.17	1.29	0.85	1.02	0.54	0.35	0.35	2.19
Ecuador	0.13	0.16	0.10	0.49	0.10	0.25	0.64	0.47	0.10	1.15	1.32	3.03	1.57	0.13	0.40	0.67
Equatorial Guinea	0.01	0.02	0.30	0.02	0.00	0.00	0.01	0.01	0.02	0.04	0.05	0.09	0.05	0.04	0.04	0.05
Fiji	0.03	2.92	1.85	2.20	6.00	0.42	9.56	0.46	0.62	0.06	0.34	7.20	10.71	6.18	5.51	3.60
Gabon	0.47	0.56	0.02	0.02	0.02	0.08	0.08	0.32	0.02	0.04	0.31	0.35	0.08	0.04	0.29	0.18

20

Georgia	0.04	0.27	0.01	1.00	0.20	0.43	0.63	2.83	1.41	1.58	25.77	4.93	5.93	6.43	3.48	3.66
Grenada	0.02	0.02	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.03	0.06	0.05	0.04	0.04	0.03	0.03
Guatemala	0.04	0.18	0.17	0.50	0.12	0.07	0.01	0.02	0.02	0.03	0.09	0.16	0.77	0.47	1.08	0.25
Guyana	0.07	0.03	0.20	0.03	0.01	0.00	1.40	1.24	1.01	0.44	1.77	2.59	5.05	2.80	18.85	2.37
Iraq	0.24	0.02	0.11	0.04	0.08	0.00	0.04	0.01	0.03	0.06	0.03	0.42	3.88	2.00	1.44	0.56
Jamaica	0.33	0.23	0.10	0.15	0.04	0.02	0.08	13.35	10.44	0.57	1.71	0.78	1.87	0.25	0.24	2.01
Jordan	0.08	0.09	0.35	0.39	0.13	0.22	0.06	0.07	0.54	0.57	22.92	2.10	10.57	17.13	38.02	6.22
Kazakhstan	0.03	0.01	0.03	0.02	0.00	0.05	0.28	0.12	0.01	0.03	0.03	0.03	0.03	0.05	0.13	0.06
Kosovo	0.01	0.01	2.78	1.84	0.11	0.12	0.08	0.15	0.31	0.27	1.10	3.68	11.64	9.47	26.73	3.89
Lebanon	0.51	0.05	0.05	0.62	0.04	0.09	1.19	1.50	4.13	6.19	0.90	8.71	1.11	1.16	22.97	3.28
Libya	0.01	0.03	0.01	0.19	0.01	0.00	0.00	0.01	0.00	0.03	0.03	0.05	0.07	0.03	0.04	0.03
Malaysia	0.01	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.03	0.09	0.08	0.05	0.03
Maldives	0.01	0.21	0.01	0.35	0.25	0.00	0.00	0.01	0.01	0.03	0.03	0.96	0.88	0.48	0.04	0.22
Marshall Islands	0.03	0.02	0.08	0.06	0.00	0.00	8.27	0.01	0.05	0.06	0.34	0.49	51.29	0.13	27.42	5.88
Mauritius	0.01	0.02	0.02	0.02	0.00	0.00	0.01	0.01	0.02	0.25	0.38	0.09	0.05	0.04	0.04	0.06
Mexico	1.04	0.54	0.57	0.06	1.15	0.92	0.52	0.13	4.45	1.49	4.04	4.17	0.75	3.06	0.15	1.54
Moldova	0.02	0.01	0.12	0.04	0.86	1.81	2.77	18.37	3.99	2.92	2.02	6.77	2.37	1.35	0.93	2.96
Montenegro	0.65	0.01	0.14	0.05	0.14	0.06	6.13	1.56	108.43	2.09	0.67	124.25	3.20	7.52	5.22	17.34
Namibia	0.20	0.70	0.34	0.02	0.00	0.26	0.01	0.32	0.58	0.46	0.44	55.52	19.28	35.11	0.33	7.57
North Macedonia	1.06	0.02	0.38	0.57	1.60	0.53	2.97	1.21	1.99	0.43	5.56	2.04	7.02	8.14	8.67	2.81
Panama	0.12	0.12	0.17	0.22	0.25	0.02	0.03	0.01	0.06	0.59	0.50	0.69	0.92	13.66	0.65	1.20
Paraguay	0.29	0.32	0.31	0.92	0.49	0.19	0.16	0.10	0.29	0.07	0.08	0.04	0.07	3.71	0.03	0.47
Peru	0.02	0.17	0.13	0.40	0.53	0.44	0.64	2.54	3.63	3.87	1.72	0.72	0.41	0.17	14.50	1.99
Serbia	2.65	1.76	0.83	0.25	6.17	3.12	2.43	3.26	0.12	0.68	0.47	2.78	19.70	0.54	31.63	5.09
South Africa	0.05	0.07	0.05	0.04	0.00	0.01	0.05	0.04	0.06	0.12	0.13	0.55	0.86	0.22	1.75	0.27
St. Lucia	0.02	0.02	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.03	0.06	0.05	0.04	0.04	0.03	0.03
St. Vincent and the Grenadines	0.02	0.02	0.03	0.04	0.02	0.02	0.01	0.01	0.01	0.03	0.06	0.05	0.04	0.04	0.03	0.03
Suriname	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.04	0.03	0.03	0.03	0.02
Thailand	0.03	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.04	0.05	0.08	0.05	0.03	0.06	0.03
Tonga	0.03	0.02	0.08	0.06	0.00	12.44	0.00	0.01	0.05	5.30	0.56	6.42	0.65	0.13	0.59	1.76
Turkey	0.68	0.02	0.03	18.27	10.53	0.06	0.08	0.15	0.07	0.11	0.08	0.04	0.20	0.42	0.56	2.09
Turkmenistan	0.06	0.07	0.08	0.08	0.03	0.08	0.08	0.02	0.01	0.29	0.22	0.20	0.21	0.22	0.12	0.12
Tuvalu	0.03	0.02	40.34	2.08	0.00	0.00	0.00	0.01	0.05	0.06	0.34	939.21	3.73	0.13	82.09	71.21
Venezuela	0.01	0.02	0.01	0.03	0.00	0.03	0.00	0.01	0.01	0.03	0.06	0.07	0.06	0.03	0.13	0.03

Table A8. Top 10 donors for lower-bound ECCE aid with COVID-19 activities over 2020 and 2021

Donor	ECCE aid with COVID-19 activities (US$, million)	ECCE aid (US$, million)	As percentage
World Bank	46.0	496.8	9.3%
LEGO Foundation	36.4	99.0	36.8%
EU Institutions	1.6	20.4	7.7%
United Kingdom	0.7	13.6	5.1%
Conrad N. Hilton Foundation	0.5	13.4	3.7%
Spain	0.4	3.0	12.6%
Inter-American Development Bank	0.3	70.1	0.5%
Canada	0.2	13.0	1.6%
Italy	0.2	47.6	0.4%
Open Society Foundations	0.1	2.4	5.5%

Table A9. Top 10 recipient countries for lower-bound ECCE aid with COVID-19 activities over 2020 and 2021

Donor	ECCE aid with COVID-19 activities (US$, million)	ECCE aid (US$, million)	As percentage
Mexico	40.1	42.6	94.1%
Panama	6.0	6.7	89.8%
Kenya	3.9	10.3	37.9%
Iraq	3.5	23.1	15.2%
Uganda	3.5	13.8	25.1%
Bangladesh	3.4	17.6	19.4%
Nigeria	2.9	7.1	40.3%
South Sudan	2.5	3.2	78.4%
South Africa	2.4	15.9	15.1%
Burkina Faso	1.8	5.6	31.2%

Table A10. Top 10 and other donors for the upper-bound ECCE aid, 2007-2021

Donor name	ECCE aid (million, 2020USD)	As percentage of total ECCE aid (%)
World Bank (IBRD/IDA)	3,792.8	20.9%
EU Institutions	1,742.6	9.6%
IMF (Concessional Trust Funds)	1,429.6	7.9%
United Kingdom	1,290.4	7.1%
United States	1,089.8	6.0%
Germany	947.6	5.2%
Japan	926.6	5.1%
Inter-American Development Bank	852.5	4.7%
Canada	655.9	3.6%
United Arab Emirates	652.2	3.6%
Other donors	4,800.1	26.4%
Sum	**18,180.1**	**100.0%**

Table A11. Top 10 and other recipient country for the upper-bound ECCE aid, 2007-2021

Recipient country	ECCE aid (million, 2020USD)	As percentage of total ECCE aid (%)
Egypt	701.66	3.9%
Ethiopia	695.75	3.8%
Brazil	670.25	3.7%
Turkey	662.45	3.6%
Bangladesh	656.98	3.6%
Argentina	573.38	3.2%
India	570.70	3.1%
Tanzania	561.91	3.1%
Jordan	508.67	2.8%
Indonesia	457.20	2.5%
Other recipients	12,121.14	66.7%
Sum	**18,180.10**	**100%**

Table A12. Upper-bound ECCE aid per ECCE-age child by recipient country region and income group, 2007-2021

Category	Number of countries	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Annual growth rate (%)
Global	134	1.0	1.1	1.7	1.9	2.0	1.4	1.7	1.4	1.4	1.5	1.8	2.0	2.0	2.6	2.8	7.6%
Income group																	
LICs	27	2.0	2.6	3.4	2.8	3.3	2.0	2.0	1.8	1.7	1.9	2.0	3.9	3.0	4.1	3.7	4.4%
LMs	55	0.8	1.0	1.6	1.3	1.5	1.3	1.7	1.2	1.2	1.3	1.2	1.2	1.6	2.1	2.5	8.3%
UMs	52	0.9	0.7	1.0	2.6	2.4	1.4	1.3	1.4	1.4	1.6	2.9	2.3	2.4	2.6	2.9	8.7%
Region																	
East Asia and Pacific	22	0.5	0.7	0.9	1.0	0.6	0.6	1.2	0.8	0.7	0.6	0.8	0.8	0.7	1.0	1.1	6.1%
Europe and central Asia	18	3.6	1.7	1.3	8.9	6.0	1.7	1.4	2.6	1.9	2.6	7.9	4.4	4.1	8.9	9.1	6.9%
Latin America and the Caribbean	26	1.3	1.2	2.4	5.1	4.8	3.5	2.9	2.9	3.0	3.4	3.5	3.5	3.1	3.9	3.8	7.9%
Middle east and north Africa	13	1.4	2.1	3.0	1.9	2.5	2.6	4.1	2.8	3.8	4.8	4.9	6.8	5.4	4.3	9.6	14.4%
South Asia	8	0.5	0.4	0.6	0.6	0.8	0.7	1.0	0.7	0.6	0.8	0.6	0.8	1.5	0.9	0.9	3.7%
Sub-Saharan Africa	47	1.7	2.1	3.3	2.5	3.1	2.1	1.8	1.6	1.6	1.5	1.8	2.0	2.2	3.8	3.3	5.0%

Note: Annual growth rate = (ECCE aid_2021 / ECCE aid_2007) ^ (1/14) – 1

Table A13. Each recipient country's annual upper-bound ECCE aid per ECCE-aged child, 2007-2021 (2020USD)

Recipient country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
Low-income country (27)																
Afghanistan	5.42	5.32	5.56	4.99	6.41	3.72	9.92	2.07	2.23	1.74	1.73	3.14	5.11	4.02	2.74	*4.28*
Burkina Faso	3.58	4.55	8.16	4.47	7.32	4.56	3.07	2.84	3.58	2.77	2.24	3.61	3.55	6.14	3.51	*4.26*
Burundi	2.41	3.04	2.64	3.28	2.04	1.02	1.90	2.11	1.23	0.94	1.18	1.11	1.44	1.04	3.98	*1.96*
Central African Republic	2.26	1.01	2.16	1.85	4.54	2.56	0.89	3.88	2.72	3.74	4.91	4.13	4.87	4.94	2.72	*3.14*
Chad	1.03	1.20	1.90	0.71	0.93	0.57	0.26	0.48	1.26	2.20	2.82	3.81	2.49	3.25	2.05	*1.66*
Congo DR	1.07	0.66	2.28	1.16	1.31	0.59	0.82	0.40	0.38	0.62	0.72	3.49	2.45	3.21	3.61	*1.52*
Eritrea	0.55	0.23	4.88	0.55	1.79	4.28	0.32	0.68	0.45	0.56	0.33	0.70	6.69	0.43	0.82	*1.55*
Ethiopia	1.27	2.96	5.08	3.36	5.44	3.13	1.30	1.09	0.64	0.75	0.75	1.62	1.98	2.70	1.28	*2.22*
Gambia	24.35	1.43	2.85	0.75	3.09	2.88	3.21	0.76	4.93	0.53	6.10	10.40	7.22	16.80	51.98	*9.15*
Guinea	2.43	1.98	0.38	0.29	1.02	3.64	1.18	2.02	1.73	2.58	2.96	2.64	1.04	5.39	0.73	*2.00*
Guinea-Bissau	2.30	2.84	5.71	1.67	6.78	0.52	1.33	8.12	2.87	3.59	2.36	2.51	1.87	1.95	3.57	*3.20*
Korea DP	0.10	0.04	0.04	0.09	0.14	0.07	0.25	2.40	0.36	0.35	0.27	0.29	0.28	0.25	0.25	*0.35*
Liberia	0.27	16.64	9.12	12.86	5.81	1.21	0.64	2.18	7.37	31.93	1.91	6.86	9.94	12.19	4.82	*8.25*
Madagascar	1.39	2.63	0.28	0.41	0.63	0.42	0.39	2.54	1.89	1.57	2.21	1.54	1.24	6.17	2.16	*1.70*
Malawi	2.71	4.76	1.19	4.54	1.40	3.64	1.99	1.13	1.58	2.30	1.72	1.98	2.18	3.52	1.83	*2.43*
Mali	3.98	4.29	4.80	5.52	7.36	1.07	4.83	4.82	3.33	2.71	3.33	3.21	5.77	4.08	5.26	*4.29*
Mozambique	5.01	7.05	7.71	7.92	6.70	5.48	3.90	6.76	3.87	2.09	1.97	2.04	2.67	6.14	2.63	*4.80*
Niger	1.43	1.37	1.10	0.75	2.12	2.53	1.69	3.57	2.87	1.60	1.72	1.52	3.42	2.81	3.94	*2.16*
Rwanda	11.73	6.07	5.36	9.74	10.70	2.33	2.82	1.01	1.39	3.30	2.82	2.24	3.33	28.64	8.87	*6.69*
Sierra Leone	3.22	3.50	4.19	3.25	1.92	1.88	2.38	4.44	8.54	3.31	5.50	5.04	4.31	16.48	13.14	*5.41*
Somalia	0.11	0.08	1.29	1.39	1.19	0.63	0.31	1.12	1.82	3.78	2.15	4.62	3.33	4.31	3.45	*1.97*
South Sudan					0.52	0.51	0.45	0.53	1.06	3.23	1.66	1.73	1.23	2.96	9.63	*1.57*
Sudan	0.62	0.80	2.10	1.40	1.21	0.40	0.24	0.32	0.51	0.39	1.45	1.28	3.93	1.22	8.63	*1.63*
Syria	0.25	0.28	0.10	0.31	0.49	0.15	3.40	2.03	3.15	4.03	8.66	10.75	10.74	8.42	8.55	*4.09*
Togo	0.15	3.32	3.25	4.32	1.73	0.43	1.14	0.29	1.19	1.21	5.06	5.01	1.70	6.56	0.79	*2.41*
Uganda	1.03	0.79	1.56	1.76	1.61	1.25	1.49	1.27	1.18	1.22	1.33	1.76	1.99	3.39	4.54	*1.74*

26

Yemen	0.20	1.52	1.99	1.89	0.78	1.26	1.53	2.16	3.58	6.30	6.55	34.12	2.25	0.69	1.50	*4.42*

Lower-middle-income countries (55)

Algeria	0.16	0.12	0.19	0.31	0.22	0.22	0.24	1.04	0.49	9.75	0.38	0.44	0.36	0.28	0.29	*0.97*
Angola	0.41	0.90	0.16	0.28	0.32	0.21	2.62	1.06	1.07	0.65	0.38	0.39	0.50	0.50	0.56	*0.67*
Bangladesh	0.37	0.48	0.43	1.29	2.97	3.72	5.10	4.66	2.53	1.15	1.86	2.29	5.88	2.42	1.41	*2.44*
Belize	4.11	3.51	0.70	6.03	5.31	1.22	1.32	2.20	22.09	3.28	10.83	9.15	9.82	1.61	1.16	*5.49*
Benin	2.85	4.05	5.75	5.77	3.78	3.99	4.33	1.96	0.89	1.11	3.36	2.77	3.49	8.53	3.98	*3.77*
Bhutan	7.07	2.68	1.45	2.36	3.39	3.49	2.98	1.17	0.81	1.40	2.34	12.02	32.33	12.20	5.20	*6.06*
Bolivia	1.14	1.57	1.75	1.89	2.52	2.22	1.69	2.98	3.29	7.65	4.40	1.83	1.72	1.69	3.49	*2.66*
Cabo Verde	15.62	13.17	10.42	27.12	31.13	26.74	30.43	42.91	19.76	10.88	37.89	11.97	15.57	41.22	25.00	*23.99*
Cambodia	0.97	1.11	0.65	1.12	2.29	1.92	3.53	3.05	3.30	3.38	5.27	5.29	1.80	1.75	6.86	*2.82*
Cameroon	0.33	2.36	2.61	1.32	0.39	0.30	0.25	0.22	0.45	0.45	6.09	3.54	3.85	4.84	2.71	*1.98*
Comoros	2.03	5.57	13.63	9.41	4.46	3.46	6.91	3.08	3.22	2.59	3.02	5.95	3.64	5.60	6.40	*5.26*
Congo	0.52	0.74	0.72	2.42	3.06	0.30	0.44	0.39	0.36	0.45	0.50	0.84	15.31	0.56	0.72	*1.82*
Côte d'Ivoire	0.14	0.30	5.95	1.74	13.10	4.17	3.78	3.22	2.33	1.51	3.23	2.29	2.39	5.27	2.77	*3.48*
Djibouti	13.54	15.09	17.96	9.44	18.80	25.30	13.35	11.60	8.67	8.97	12.36	12.30	15.88	23.22	12.75	*14.62*
Egypt	1.04	2.37	3.68	0.86	0.86	0.81	9.87	1.51	5.86	4.67	0.59	2.20	2.22	1.10	12.69	*3.36*
El Salvador	0.86	2.19	2.88	3.37	2.54	3.07	1.39	1.27	1.27	1.80	1.89	2.54	2.44	2.26	4.31	*2.27*
Eswatini	1.20	0.61	0.61	0.18	1.64	2.52	1.84	1.36	3.43	18.92	18.38	4.01	3.09	2.27	1.13	*4.08*
Ghana	3.75	5.15	6.20	6.35	8.90	10.80	1.70	2.36	9.36	5.75	4.17	4.76	2.51	18.65	1.94	*6.16*
Haiti	1.56	3.22	5.74	9.17	5.35	2.93	1.18	1.52	2.34	2.56	2.36	5.33	2.03	4.43	3.97	*3.58*
Honduras	4.69	6.15	6.16	5.22	5.96	7.85	3.32	2.66	3.19	2.35	1.50	1.91	2.20	11.06	6.36	*4.71*
India	0.13	0.12	0.12	0.18	0.25	0.07	0.10	0.09	0.14	0.53	0.28	0.38	0.80	0.33	0.40	*0.26*
Indonesia	1.83	2.63	2.92	2.52	0.78	0.53	0.97	0.33	0.44	0.39	0.32	0.49	0.44	1.41	0.41	*1.09*
Iran	0.18	0.19	0.16	0.12	0.12	0.09	0.18	0.13	0.14	0.36	0.27	0.40	0.48	0.31	0.41	*0.24*
Kenya	1.61	0.57	2.29	0.52	2.91	2.09	3.00	1.34	1.47	1.07	1.90	1.41	1.14	5.67	4.05	*2.07*
Kiribati	2.99	29.53	26.48	31.46	5.88	10.79	5.79	7.30	3.75	9.21	37.42	54.46	22.77	28.91	94.86	*24.77*
Kyrgyzstan	0.76	5.50	3.56	4.87	4.39	2.75	4.93	7.99	3.65	2.79	3.51	1.13	2.11	12.52	9.28	*4.65*
Lao	0.92	3.07	2.87	11.74	4.85	8.45	4.82	2.92	6.79	6.04	5.30	10.15	7.36	7.29	4.77	*5.82*

27

Country															
Lesotho	0.17	0.32	2.07	7.60	4.28	8.59	5.75	0.37	0.59	4.03	11.71	2.21	1.30	3.08	1.41	*3.57*
Mauritania	2.21	0.83	0.23	2.34	3.79	2.12	3.54	1.32	7.63	4.41	2.96	3.96	3.44	8.47	7.37	*3.64*
Micronesia	4.62	5.41	0.26	3.78	3.14	3.17	1.52	2.20	2.19	17.98	7.07	14.12	9.28	6.38	8.91	*6.00*
Mongolia	2.00	3.28	1.97	18.92	12.02	14.28	11.81	6.09	7.53	8.37	33.89	18.87	11.44	29.26	8.05	*12.52*
Morocco	1.80	2.19	6.45	3.80	8.43	5.11	2.74	3.44	0.98	1.14	6.07	1.69	8.38	7.98	29.65	*5.99*
Myanmar	1.14	1.24	0.71	0.88	0.60	1.56	15.85	3.16	1.97	3.68	2.14	1.13	1.41	2.91	1.68	*2.67*
Nepal	3.62	3.75	8.39	5.86	5.18	6.80	4.55	4.63	6.34	4.52	2.09	3.40	3.08	7.95	3.42	*4.91*
Nicaragua	9.23	10.97	12.12	10.85	13.40	4.24	5.99	4.19	11.48	0.94	1.88	1.65	1.86	8.88	4.21	*6.79*
Nigeria	0.20	0.25	0.25	0.29	0.18	0.15	0.22	0.28	0.39	0.54	0.78	0.41	0.38	0.46	0.57	*0.36*
Pakistan	1.77	0.33	1.34	0.93	0.82	0.75	0.73	0.95	0.71	1.03	0.54	1.05	1.26	1.34	2.22	*1.05*
Papua New Guinea	0.39	0.41	0.41	0.80	7.61	0.74	0.77	0.52	1.09	1.55	3.99	4.38	1.66	5.44	11.93	*2.78*
Philippines	0.20	0.36	0.64	1.80	2.03	1.59	0.82	2.11	0.96	0.30	2.10	1.49	0.46	1.67	2.01	*1.24*
Samoa	9.28	10.08	29.55	106.42	46.92	26.65	21.87	6.13	11.19	13.94	9.55	10.22	4.71	76.31	121.73	*33.64*
Senegal	5.33	6.70	7.21	5.24	8.95	9.01	3.46	2.36	1.14	2.25	1.16	1.53	2.96	9.79	6.38	*4.90*
Solomon Islands	1.11	1.03	1.08	25.98	11.46	12.45	9.97	5.83	6.50	3.33	4.46	4.58	4.76	11.90	45.22	*9.98*
Sri Lanka	1.07	1.73	1.08	1.04	1.09	0.50	2.33	0.96	0.81	3.48	2.81	4.12	3.77	5.03	2.35	*2.14*
São Tomé and Principe	4.45	3.47	2.85	1.60	3.34	3.20	6.43	4.06	21.40	5.37	4.62	2.55	7.81	27.53	39.58	*9.22*
Tajikistan	0.40	0.49	1.76	2.38	1.19	2.00	1.64	1.30	5.36	3.22	2.09	1.61	2.95	11.89	3.68	*2.80*
Tanzania	4.21	4.02	7.86	4.49	2.73	3.59	4.60	2.06	1.94	1.33	1.00	0.87	0.92	3.33	6.50	*3.30*
Timor-Leste	8.79	9.57	13.10	11.03	20.59	10.02	28.19	42.19	27.78	28.82	29.88	33.56	30.68	29.95	18.83	*22.86*
Tunisia	3.85	0.39	4.06	9.42	5.54	36.26	2.73	10.23	5.00	6.33	5.67	1.83	12.33	8.51	23.65	*9.05*
Ukraine	0.43	0.41	0.38	0.57	0.52	0.99	0.78	6.42	1.75	6.20	1.20	1.25	3.05	21.92	19.56	*4.36*
Uzbekistan	0.20	0.33	0.66	2.21	1.71	0.41	0.41	0.40	0.44	0.55	0.36	0.46	0.52	2.47	3.16	*0.95*
Vanuatu	4.83	29.45	15.99	16.22	7.53	18.50	67.97	81.37	115.01	86.60	92.08	70.78	49.59	29.24	42.45	*48.51*
Vietnam	0.85	1.50	4.33	2.09	1.44	2.00	4.70	5.19	4.24	1.72	2.22	1.10	1.48	1.02	1.09	*2.33*
West Bank and Gaza	9.31	19.90	29.36	21.69	46.82	21.87	13.17	10.16	6.12	7.58	40.37	40.28	34.58	23.81	20.58	*23.04*
Zambia	1.80	3.01	12.95	7.66	3.59	3.74	2.63	5.23	1.79	2.26	2.21	1.34	3.23	2.56	6.48	*4.03*
Zimbabwe	0.16	0.30	0.40	0.34	0.33	0.56	0.34	1.12	1.26	0.81	0.83	0.72	0.74	0.61	0.68	*0.61*

Upper-middle-income countries (52)

28

Albania	3.58	2.82	2.25	1.54	4.32	7.54	5.22	6.58	1.95	1.61	2.86	6.40	20.38	23.33	73.58	*10.93*
Argentina	1.09	1.29	1.87	19.46	16.52	15.72	15.90	12.88	8.23	7.08	8.00	2.28	3.63	7.07	9.39	*8.69*
Armenia	3.91	3.28	3.60	9.34	24.07	8.18	7.21	2.63	2.78	5.74	5.19	4.71	52.71	10.45	12.17	*10.40*
Azerbaijan	0.09	0.95	0.32	2.40	5.41	0.69	0.85	0.50	0.42	0.61	66.03	2.34	0.80	2.31	0.66	*5.62*
Belarus	0.14	0.37	0.21	0.61	0.62	0.45	0.70	0.65	0.81	1.17	1.66	1.10	1.72	31.85	0.72	*2.85*
Bosnia and Herzegovina	0.81	4.04	2.94	1.85	3.76	3.25	3.97	4.10	1.74	2.15	3.22	5.64	28.34	5.35	31.95	*6.87*
Botswana	0.32	0.45	0.97	31.18	125.24	1.46	15.99	33.83	7.34	2.21	15.03	1.06	1.43	1.27	6.19	*16.27*
Brazil	0.65	0.31	1.60	6.59	6.17	3.44	1.94	2.51	1.40	2.73	2.84	2.34	2.89	2.00	0.85	*2.55*
China	0.06	0.08	0.09	0.11	0.10	0.10	0.10	0.11	0.14	0.22	0.24	0.41	0.40	0.42	0.52	*0.21*
Colombia	0.18	0.47	1.66	2.29	3.59	2.18	2.68	0.91	0.65	4.15	1.10	1.26	1.28	2.28	4.37	*1.94*
Costa Rica	0.34	1.41	1.38	1.62	1.95	2.77	2.59	1.57	1.25	1.31	1.77	2.09	2.39	2.95	3.12	*1.90*
Cuba	0.41	0.53	1.75	0.41	0.43	0.61	0.61	0.32	0.34	0.59	0.76	0.66	1.20	0.30	1.03	*0.67*
Dominica	0.05	21.96	16.85	38.79	30.42	12.79	24.88	9.32	33.08	33.13	16.66	31.67	101.37	65.96	6.98	*29.60*
Dominican Republic	6.25	6.33	8.41	9.47	5.43	4.32	1.61	1.70	3.11	1.84	1.46	1.64	0.96	3.60	0.92	*3.80*
Ecuador	0.34	1.14	6.34	1.77	1.07	1.10	2.43	1.38	0.70	13.57	8.92	11.47	10.13	1.29	4.28	*4.40*
Equatorial Guinea	5.14	0.51	6.93	14.62	2.00	1.31	0.66	0.67	0.37	0.56	0.43	0.49	16.41	0.39	0.75	*3.42*
Fiji	2.44	7.62	62.01	22.22	8.52	3.88	10.65	1.34	3.00	4.61	11.57	8.99	14.57	9.09	90.42	*17.40*
Gabon	0.77	0.66	0.15	0.37	4.49	3.86	1.97	1.89	0.91	0.40	98.13	13.85	25.09	13.35	0.81	*11.11*
Georgia	5.28	19.15	3.10	4.87	3.41	15.50	13.71	26.93	14.87	2.81	28.78	8.66	13.96	43.22	15.15	*14.63*
Grenada	0.05	32.70	52.68	39.46	5.73	0.11	1.02	38.70	13.31	14.84	9.67	2.32	37.01	61.95	0.36	*20.66*
Guatemala	0.44	1.57	5.08	1.60	0.60	5.43	5.18	6.10	1.22	5.56	3.00	5.74	6.52	4.94	2.81	*3.72*
Guyana	0.66	4.03	3.36	0.77	0.69	2.00	1.86	2.36	1.23	0.93	2.58	3.12	5.78	3.17	22.55	*3.67*
Iraq	3.33	0.57	1.73	0.77	0.60	0.15	0.51	1.96	3.28	3.89	4.53	5.35	7.01	3.64	2.91	*2.68*
Jamaica	1.52	9.41	11.11	49.43	8.27	1.07	5.55	18.21	16.26	2.02	3.71	2.32	7.66	0.90	0.99	*9.23*
Jordan	8.35	20.57	14.18	16.20	18.85	21.43	14.50	27.85	21.22	10.61	44.98	22.80	42.99	46.04	54.68	*25.68*
Kazakhstan	0.21	0.23	0.44	0.44	0.30	0.43	0.53	0.28	0.42	1.69	0.49	0.50	0.58	0.61	0.36	*0.50*
Kosovo	0.03	0.06	9.57	12.98	3.89	5.54	2.39	6.80	12.88	5.51	7.03	7.81	14.38	25.94	43.33	*10.54*
Lebanon	3.05	11.50	7.57	3.20	2.03	3.68	6.60	18.34	18.56	33.18	52.34	29.13	41.97	56.11	48.14	*22.36*
Libya	0.08	0.13	0.14	0.39	0.68	1.44	0.14	1.01	1.15	0.63	2.92	2.40	1.92	1.06	0.94	*1.00*

29

Country																
Malaysia	0.19	0.25	0.14	0.27	0.36	0.37	0.33	0.29	0.27	0.38	0.38	0.48	0.53	0.45	0.39	*0.34*
Maldives	8.74	5.21	1.80	6.55	4.21	3.25	2.37	2.59	3.75	3.84	5.15	2.34	3.45	47.96	0.60	*6.79*
Marshall Islands	6.56	5.91	0.42	17.03	21.60	12.44	15.32	5.10	6.27	6.90	14.69	3.33	54.31	1.91	61.34	*15.54*
Mauritius	10.61	43.49	70.08	69.85	39.99	26.62	79.62	78.70	13.58	14.14	0.67	0.41	0.38	0.36	110.33	*37.25*
Mexico	2.04	0.77	1.10	0.45	2.59	1.28	0.86	0.40	4.75	1.82	4.45	4.59	1.19	3.47	0.62	*2.02*
Moldova	26.05	20.66	11.20	57.54	35.22	28.39	3.72	23.19	4.72	7.44	6.45	10.73	7.62	50.38	29.16	*21.50*
Montenegro	0.88	3.86	4.04	3.77	2.97	4.13	11.62	6.46	113.68	3.47	2.34	125.44	4.52	41.73	38.85	*24.52*
Namibia	0.65	4.30	6.52	3.73	11.81	14.90	14.76	3.13	10.94	2.43	3.29	58.32	22.17	36.57	22.77	*14.42*
North Macedonia	2.50	19.43	13.54	2.09	4.11	5.34	7.49	7.53	5.53	3.42	8.24	5.38	10.33	48.56	42.26	*12.38*
Panama	6.38	2.96	3.21	1.21	0.85	0.70	8.47	16.18	0.82	1.34	1.05	4.44	1.38	18.85	1.14	*4.60*
Paraguay	1.33	1.67	2.62	4.61	1.65	1.05	0.95	1.51	1.00	2.33	6.76	6.37	14.39	4.48	9.14	*3.99*
Peru	1.03	1.36	1.49	1.39	1.52	1.04	1.49	3.24	4.58	4.75	2.89	6.34	8.44	11.31	24.23	*5.01*
Serbia	3.29	5.40	6.23	5.40	13.54	6.91	9.19	15.24	5.48	14.37	77.73	24.50	37.39	3.85	37.77	*17.75*
South Africa	0.19	0.63	0.67	0.59	0.72	0.95	1.37	0.64	1.35	1.49	1.20	1.36	2.03	1.14	2.54	*1.12*
St. Lucia	0.88	1.90	21.75	2.05	25.74	29.08	56.48	38.28	5.57	9.29	15.09	11.69	7.38	95.21	21.03	*22.76*
St. Vincent and the Grenadines	1.80	1.34	25.75	1.61	30.14	37.38	54.15	42.02	39.21	3.43	2.55	8.21	6.49	103.20	103.10	*30.69*
Suriname	60.19	0.11	26.13	4.26	0.73	0.12	0.28	0.35	12.86	0.20	0.44	40.62	27.92	0.70	16.73	*12.78*
Thailand	0.22	0.16	0.13	0.32	0.40	0.53	3.21	0.21	0.28	0.42	0.40	0.51	0.54	0.61	0.42	*0.56*
Tonga	25.11	27.31	2.07	17.23	32.03	34.55	126.69	7.69	65.41	61.25	35.56	27.98	10.20	17.28	61.36	*36.78*
Turkey	7.88	1.24	0.89	19.29	11.61	0.98	0.78	0.96	0.96	2.45	9.10	8.55	4.29	5.96	9.54	*5.63*
Turkmenistan	0.23	0.24	0.27	0.13	0.08	0.14	0.17	0.13	0.13	0.55	0.42	0.60	0.49	0.46	0.40	*0.30*
Tuvalu	9.19	97.92	94.05	90.16	60.20	355.31	259.56	237.79	494.07	71.89	327.95	1071.53	257.40	152.71	312.74	*259.50*
Venezuela	0.06	0.23	0.40	0.41	0.33	0.41	0.35	0.32	0.50	0.34	0.47	0.53	0.99	0.94	1.60	*0.53*

30

Figure A1. Flow chart of project search and review process
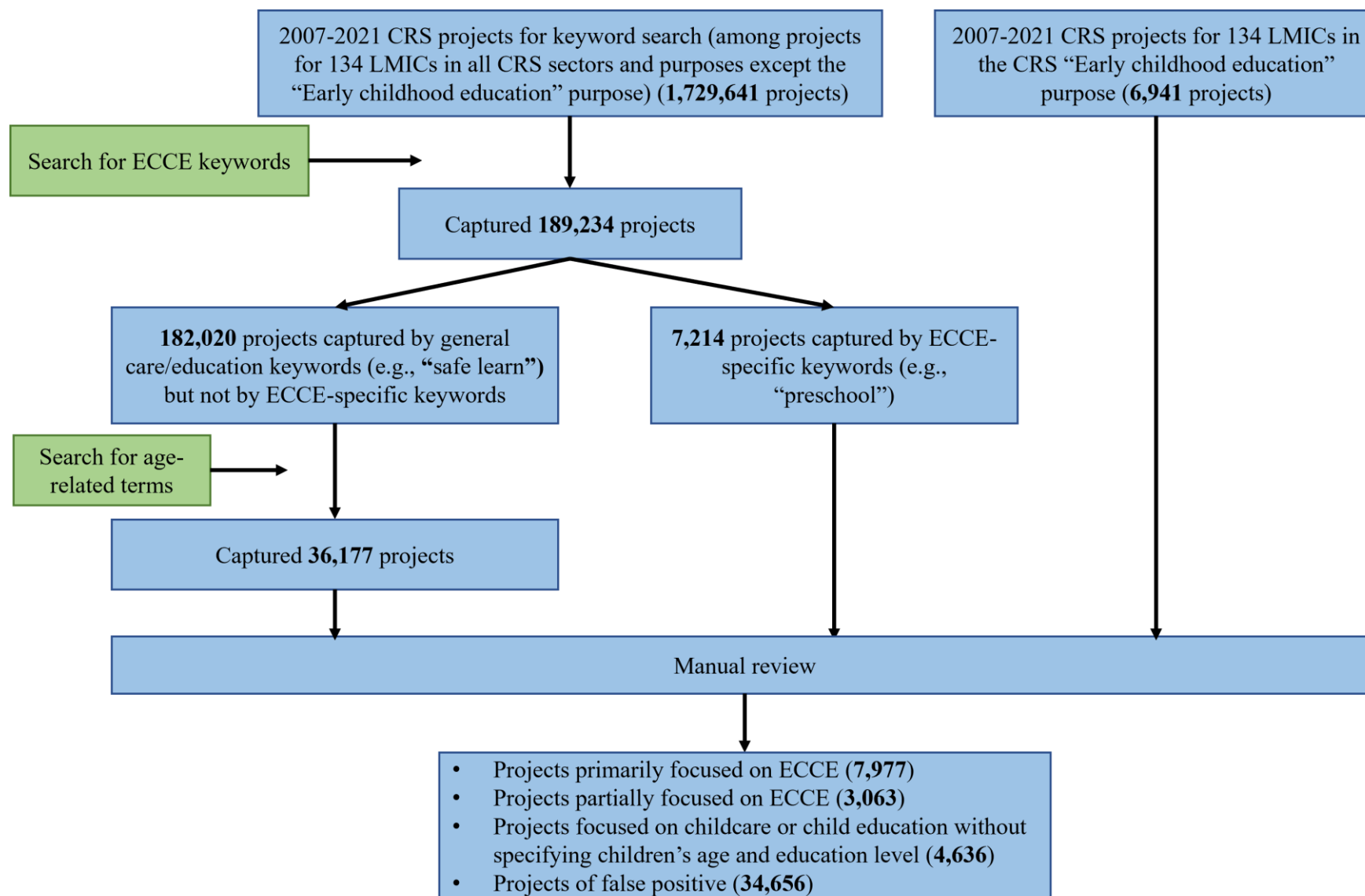
Figure A2. Lower-bound ECCE aid levels and trends by recipient countries' income groups, 2007-2021
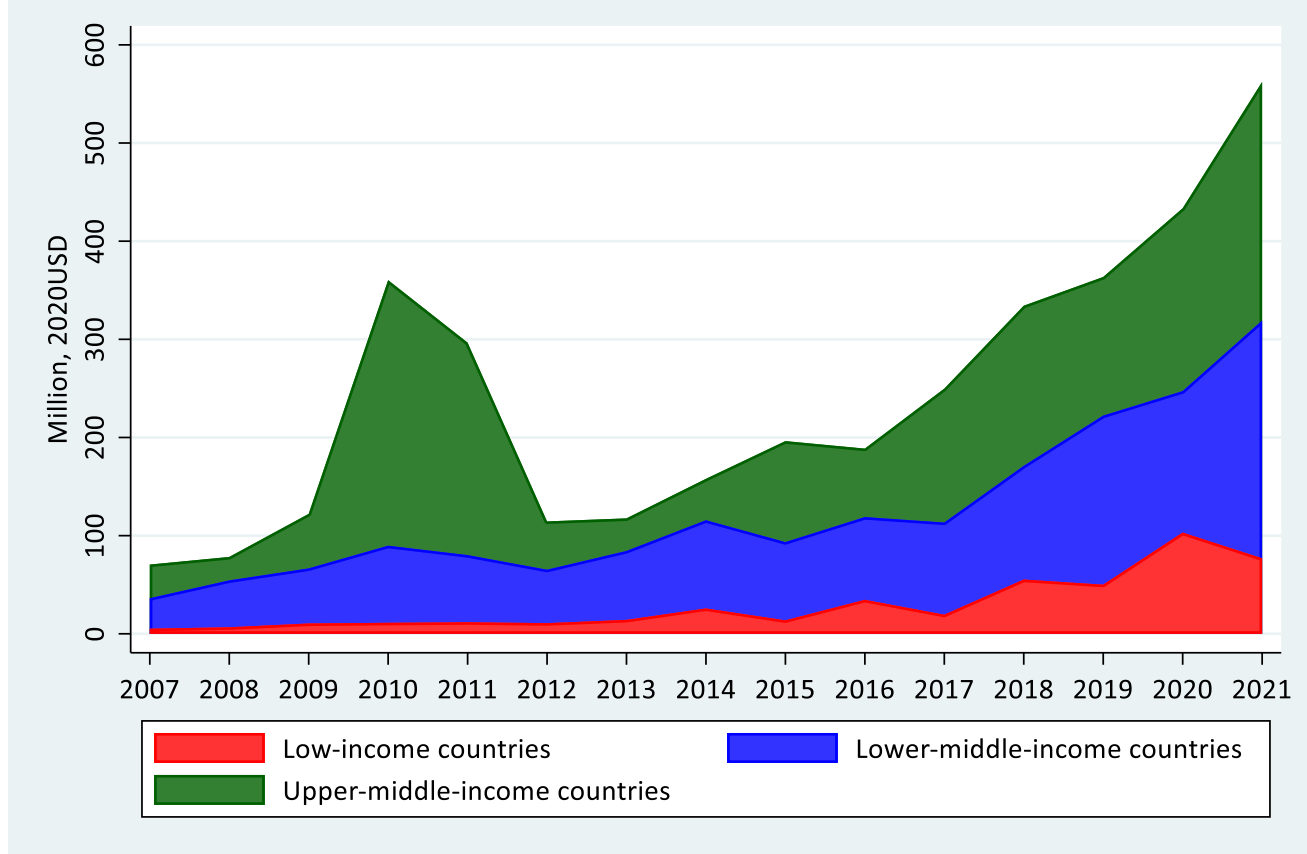
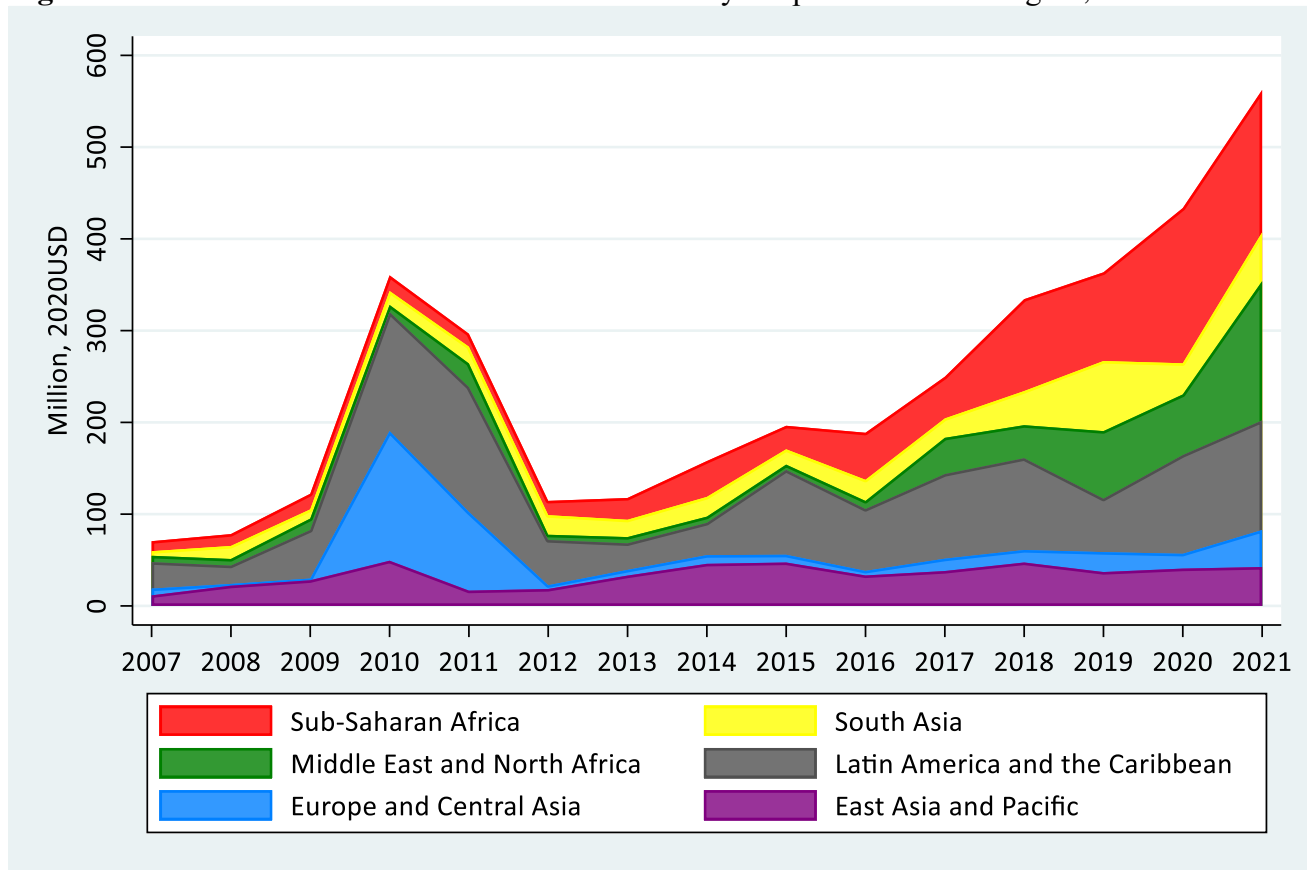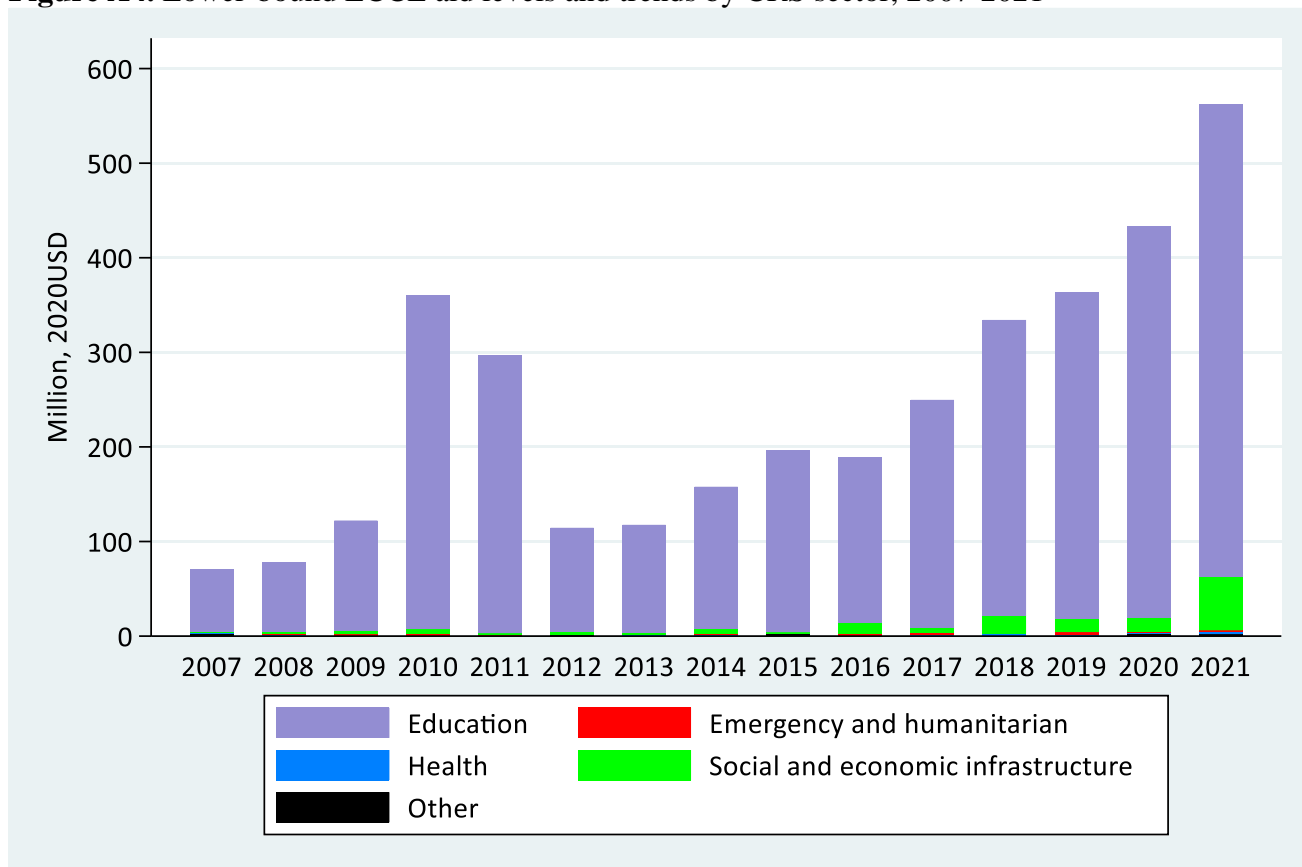**Figure A3.** Lower-bound ECCE aid levels and trends by recipient countries' region, 2007-2021

Figure A4. Lower-bound ECCE aid levels and trends by CRS sector, 2007-2021

Note: In this figure, we combined the sectors "Basic education", "Secondary education" "Post-secondary education", "Education, level unspecified" as "Education"; combined "Emergency response", "Conflict, peace & security", "Refugees in donor countries", "Reconstruction relief & rehabilitation", and "Disaster prevention & preparedness" as "Emergency and humanitarian"; combined "Health, general", "Basic health", "Non-communicable disease (NCDs)", and "Population policies/programmes & reproductive health" as "Health"; combined "Government & civil society-general", "Other social infrastructure & services", "Water supply & sanitation", "Energy policy", "Energy generation, renewable sources", and "Banking & financial services" as "Social and economic infrastructure".

Figure A5. Lower-bound ECCE aid levels and trends by channel, 2007-2021
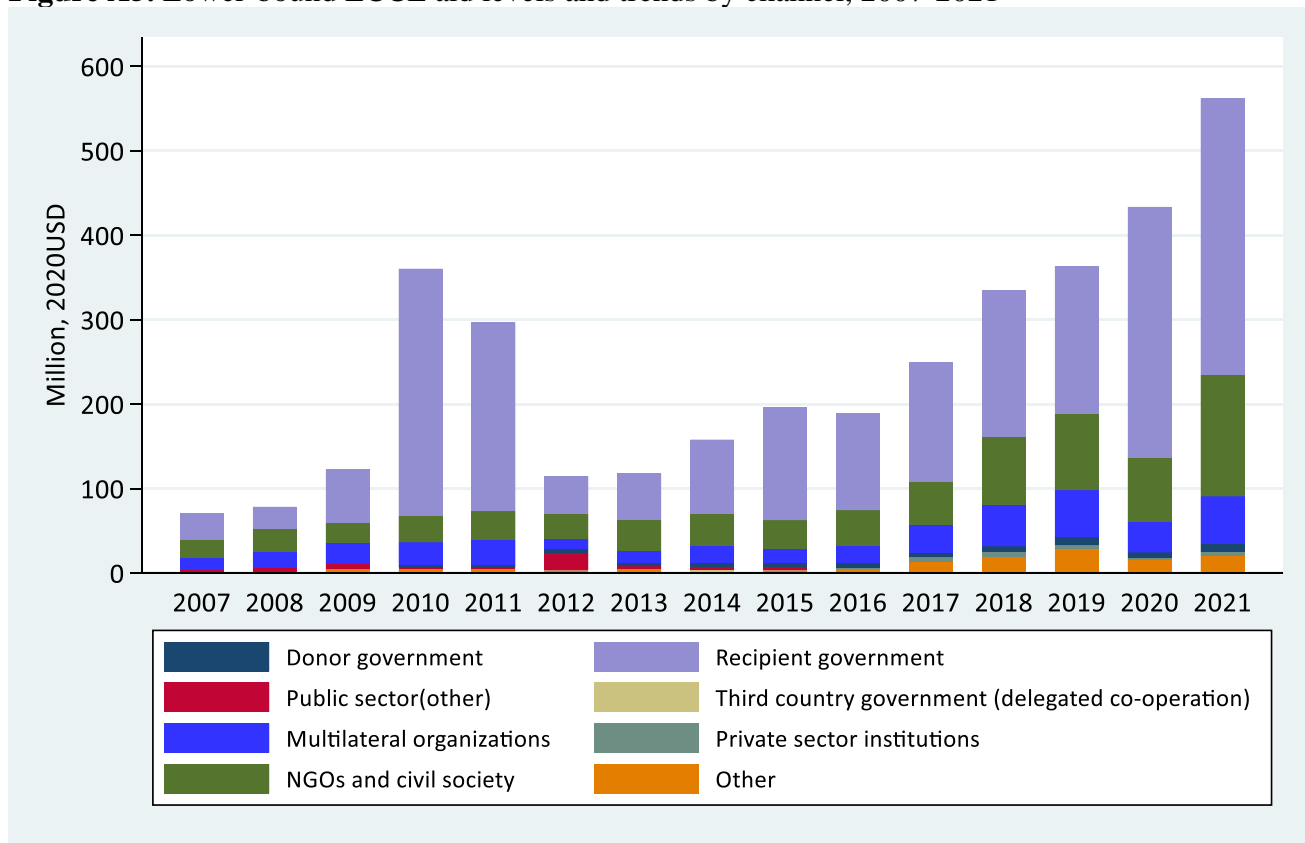
Figure A6. Lower-bound ECCE aid levels and trends by flow type, 2007-2021
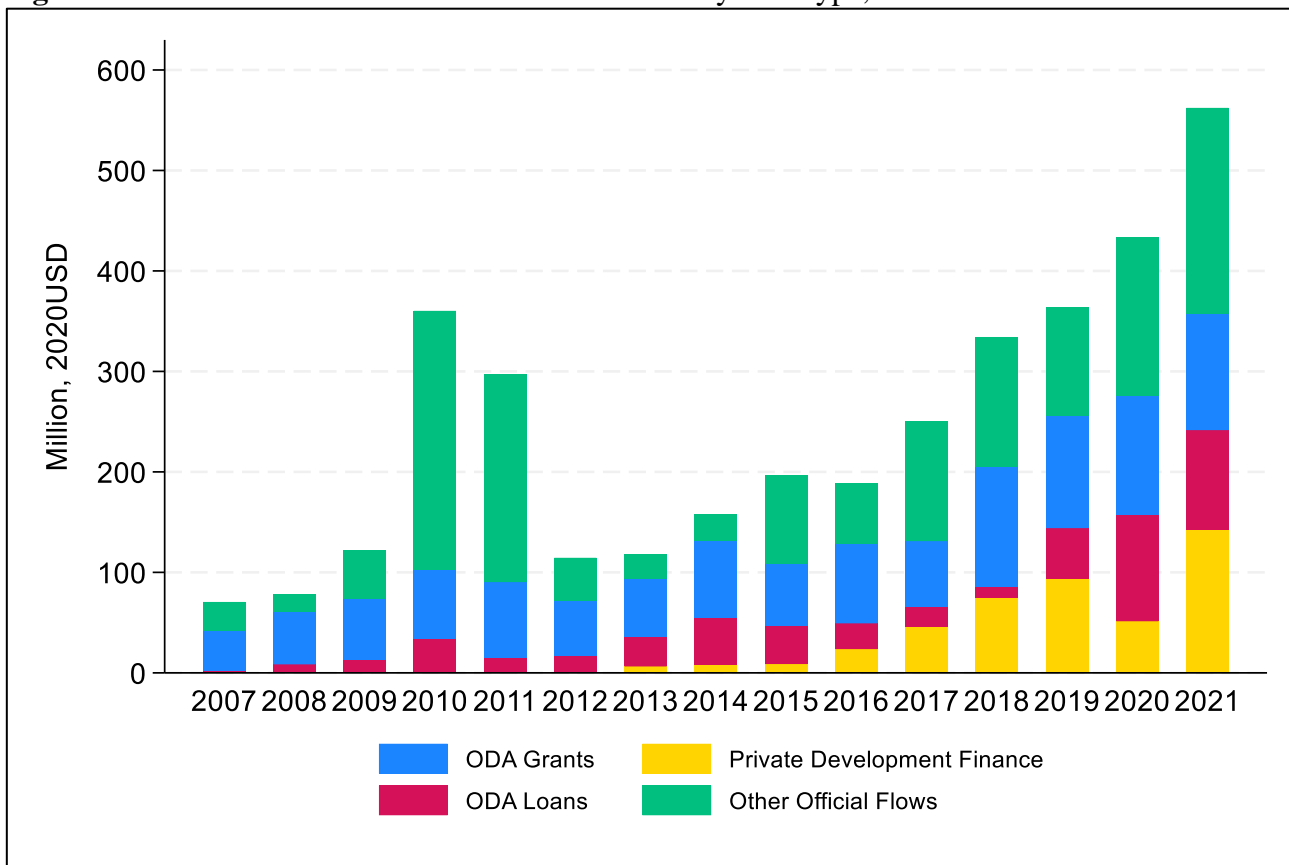
Figure A7. Donor's lower-bound ECCE aid as percentage of DAE disbursed during the SDG study years (2016-2021)

Legend:
- DAC members (red)
- Multilateral institutions (green)
- Other donors (dark blue)

| Donor	Percentage
Wellcome Trust*	102.2%
Bernard van Leer Foundation	99.9%
John D. & Catherine T. MacArthur Foundation	85.4%
H&M Foundation	72.0%
LEGO Foundation	57.9%
Children's Investment Fund Foundation	53.4%
Botnar Foundation	50.4%
Conrad N. Hilton Foundation	40.8%
Charity Projects Ltd (Comic Relief)	40.1%
Open Society Foundations	32.6%
UNICEF	25.6%
BBVA Microfinance Foundation	18.6%
Greece	18.5%
UBS Optimus Foundation	14.8%
Jacobs Foundation	14.1%
German Postcode Lottery	13.3%
Omidyar Network Fund, Inc.	12.7%
Monaco	12.4%
Liechtenstein	9.3%
People's Postcode Lottery	8.1%
Council of Europe Development Bank	8.1%
Dutch Postcode Lottery	7.9%
Italy	7.4%
New Zealand	6.9%
World Bank(IBRD/IDA)	6.5%
Inter-American Development Bank	6.4%
Oak Foundation	6.3%
UNDP	6.0%
IKEA Foundation	4.4%
United Arab Emirates	3.8%
Bill & Melinda Gates Foundation	3.7%
Ireland	3.2%
Swedish Postcode Lottery	3.1%
Czech Republic	2.9%
Croatia	2.6%
Belgium	2.5%
Finland	2.5%
Spain	2.3%
Hungary	2.2%
Canada	2.1%
Laudes Foundation	2.1%
Korea	2.0%
William & Flora Hewlett Foundation	2.0%
Slovak Republic	1.5%
Norway	1.1%
EU Institutions	0.8%
Japan	0.8%
Qatar	0.7%
Luxembourg	0.7%
United Kingdom	0.6%
Turkey	0.5%
Poland	0.5%
Michael & Susan Dell Foundation	0.4%
Switzerland	0.3%
United States	0.3%
Estonia	0.3%
Australia	0.3%
Denmark	0.2%
OPEC Fund for International Development	0.2%
Ford Foundation	0.1%
Germany	0.1%
Lithuania	0.1%
France	0.1%
Austria	0.1%
Portugal	0.1%
La Caixa Banking Foundation	0.0%
Iceland	0.0%
Carnegie Corporation of New York	0.0%
Romania	0.0%
Slovenia	0.0%
Sweden	0.0%
Asian Development Bank	0.0%
Mastercard Foundation	0.0%
Netherlands	0.0%
Arab Fund (AFESD)	0.0%
World Diabetes Foundation**	

UNICEF-recommended 10% of DAE to ECCE — — —

Note:
1. Percentages are calculated by dividing each donor's total ECCE aid disbursed during the SDG study years (2016-2021) by the donor's total project disbursements reported under the four CRS education sectors during the same years. The four CRS education sectors include "basic education", "secondary education", "post-secondary education", and "education, level unspecified".

2. The percentage may exceed 100% when donors reported ECCE aid projects under sectors other than the four CRS education sectors, and the aid value for these ECCE projects was larger than the total aid value under the four education sectors (e.g., Wellcome Trust*).

3. The percentage may be missing when donors reported ECCE aid projects under other than the four CRS education sectors but did not report any aid projects under the four education sectors. (e.g., World Diabetes Foundation**).

Figure A8. Lower-middle-income countries' match between ranks in lower-bound ECCE aid per child and enrolment rate

Lower-middle-income countries match

- Low-income countries
- Lower-middle-income countries
- Upper-middle-income countries
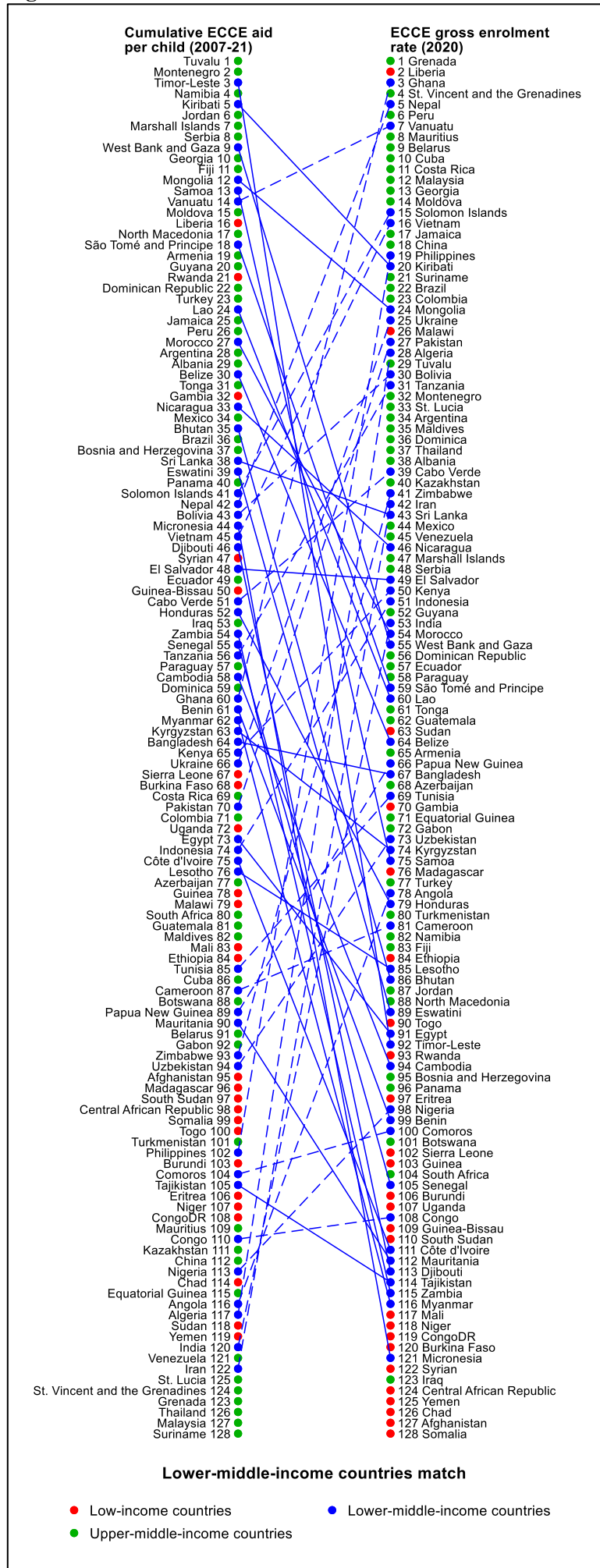
Figure A9. Upper-middle-income countries' match between ranks in lower-bound ECCE aid per child and enrolment rate

Upper-middle-income countries match

● Low-income countries   ● Lower-middle-income countries

● Upper-middle-income countries
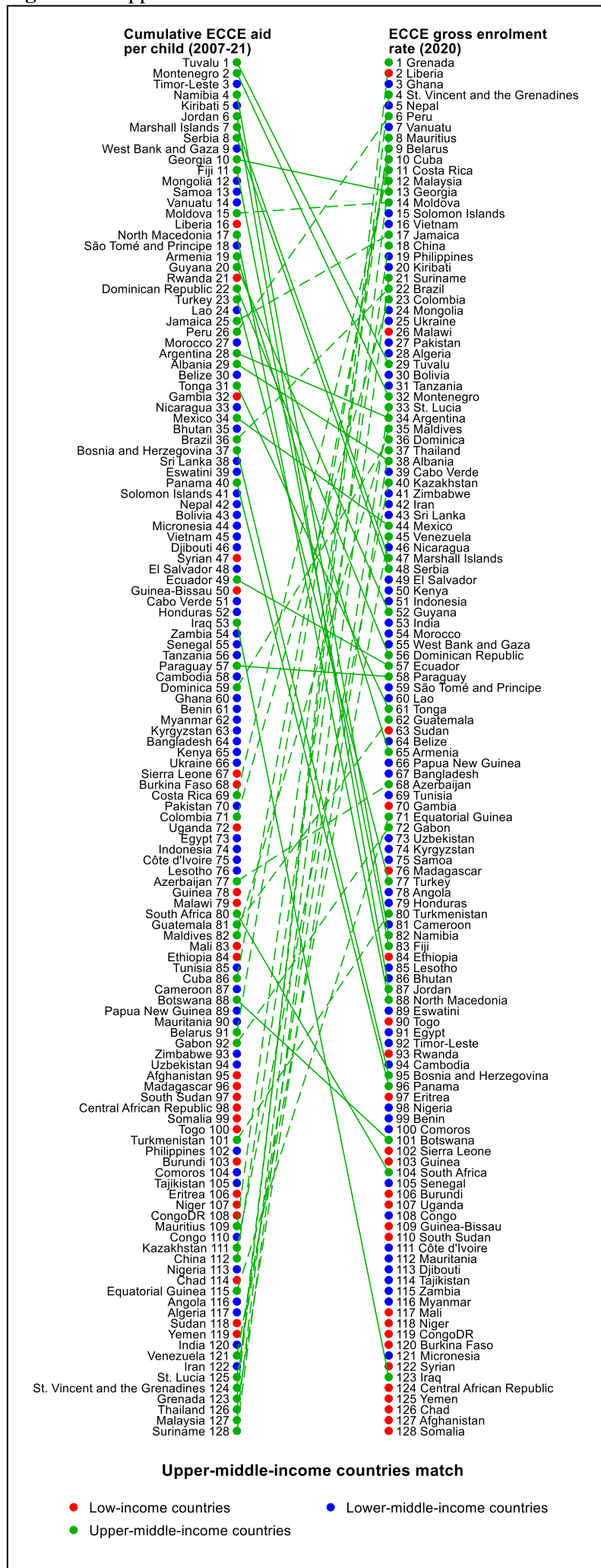
Figure A10. Average lower-bound ECCE aid per ECCE-age child among conflict-affected countries versus non-conflict-affected countries
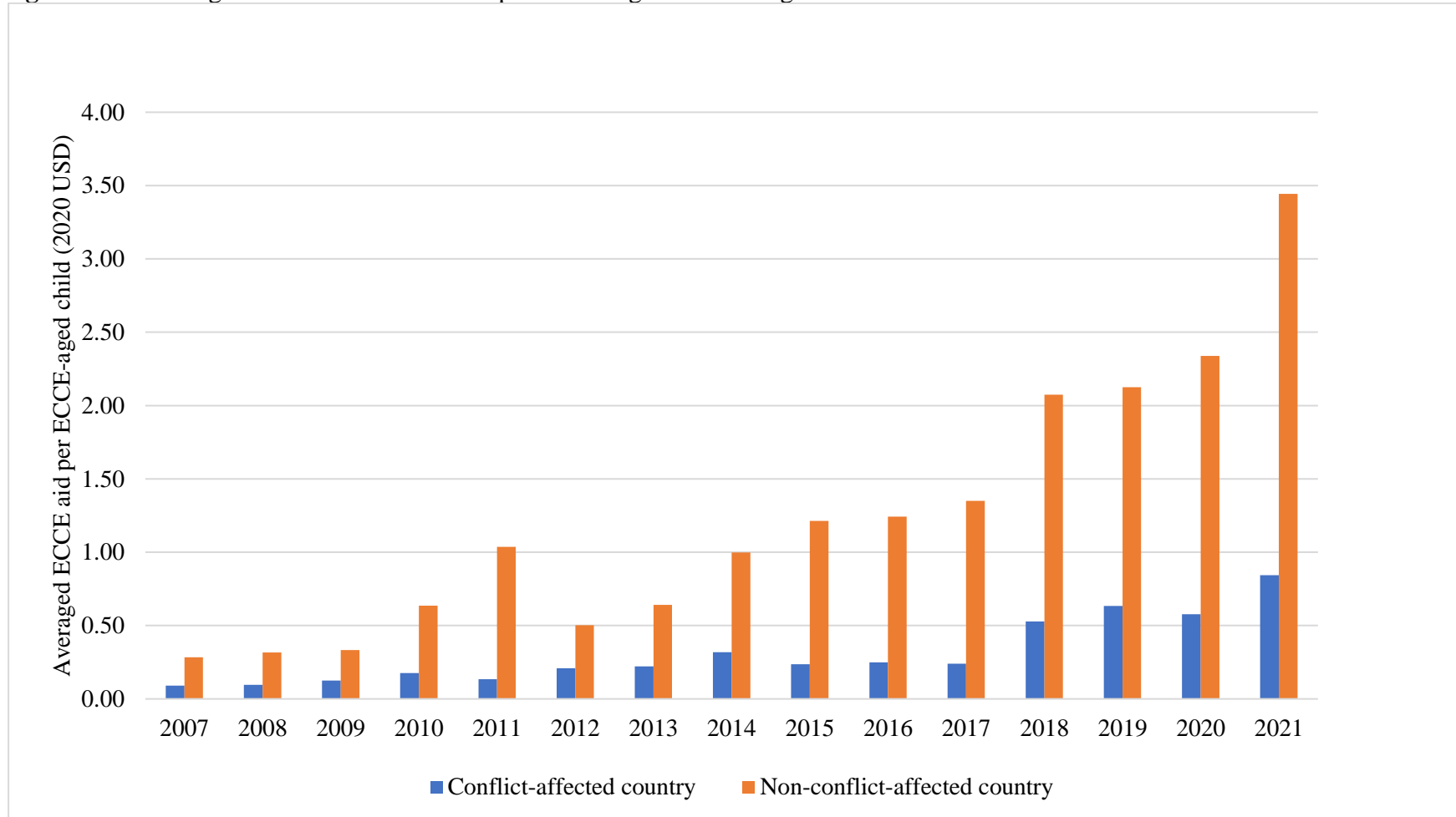
Figure A11. Upper-bound ECCE aid and as percentage of DAE, 2007-2021
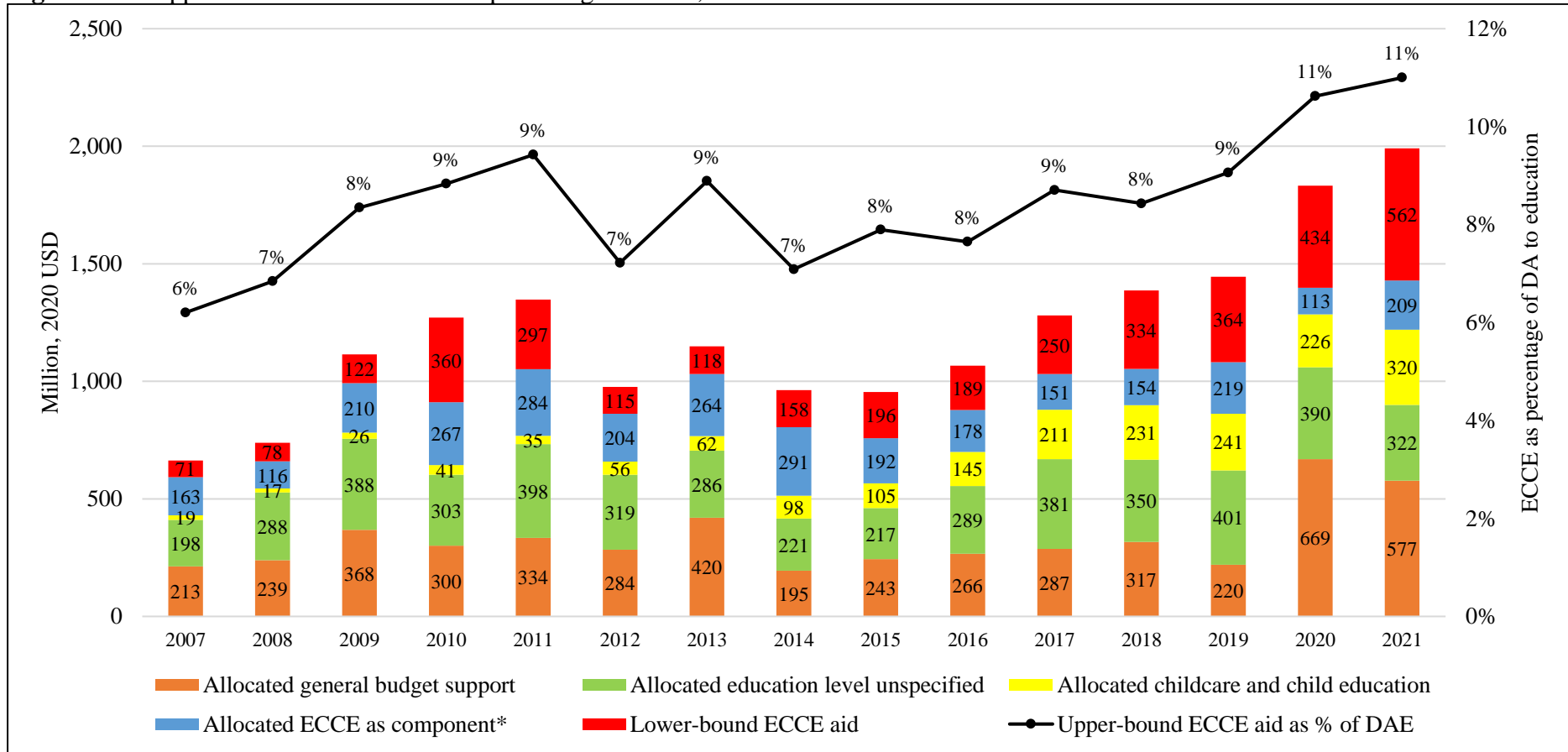
*. Allocation ECCE as component = allocated disbursements of the projects integrating ECCE and higher-than-ECCE educational activities at the country, regional, and bilateral levels + allocated disbursements of the projects integrating ECCE and non-educational activities at the regional and bilateral levels.

Figure A12. Annual upper-bound ECCE aid by World Bank income group, 2007-2021
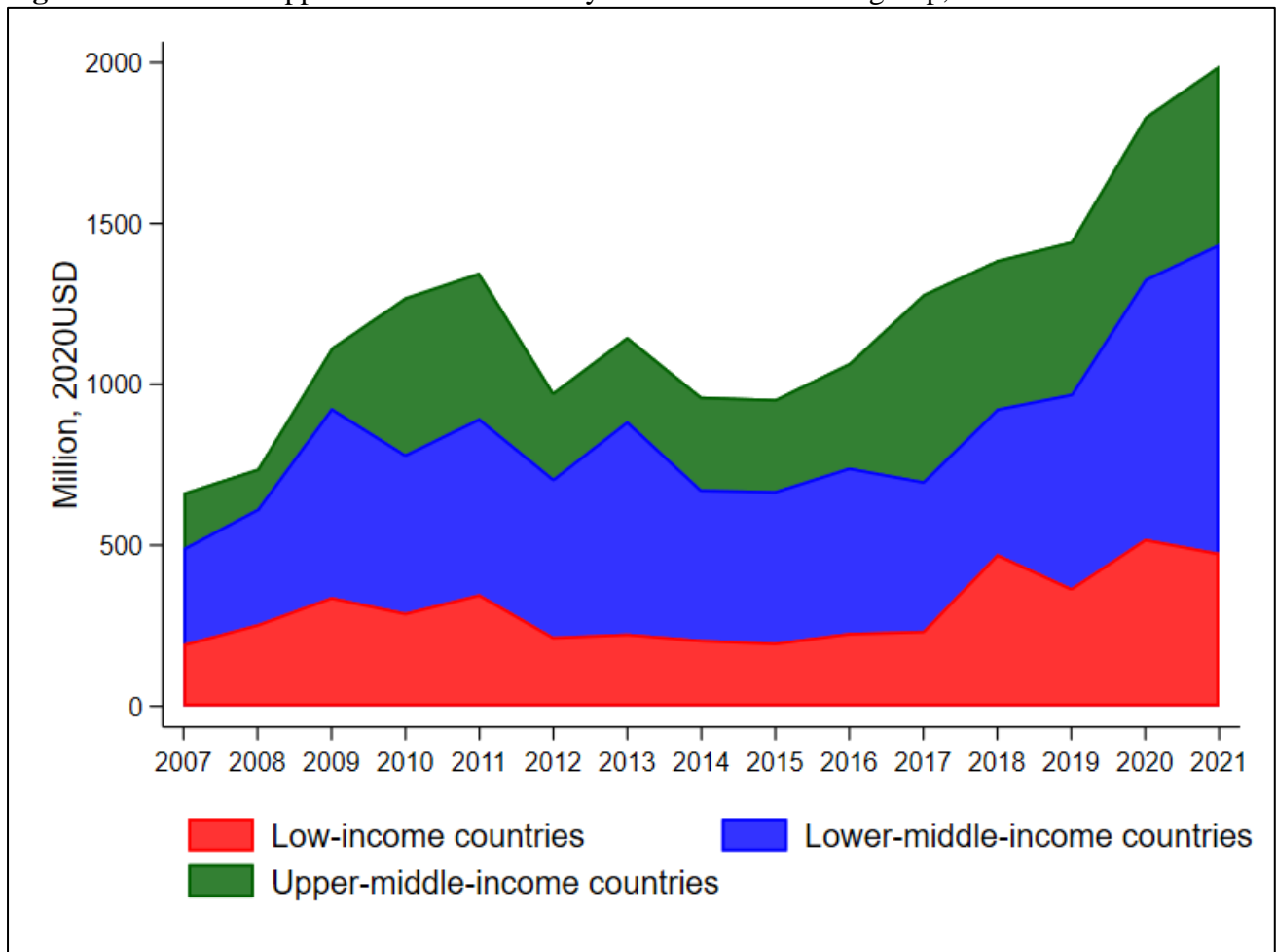
Figure A13. Annual upper-bound ECCE aid by World Bank region, 2007-2021

43
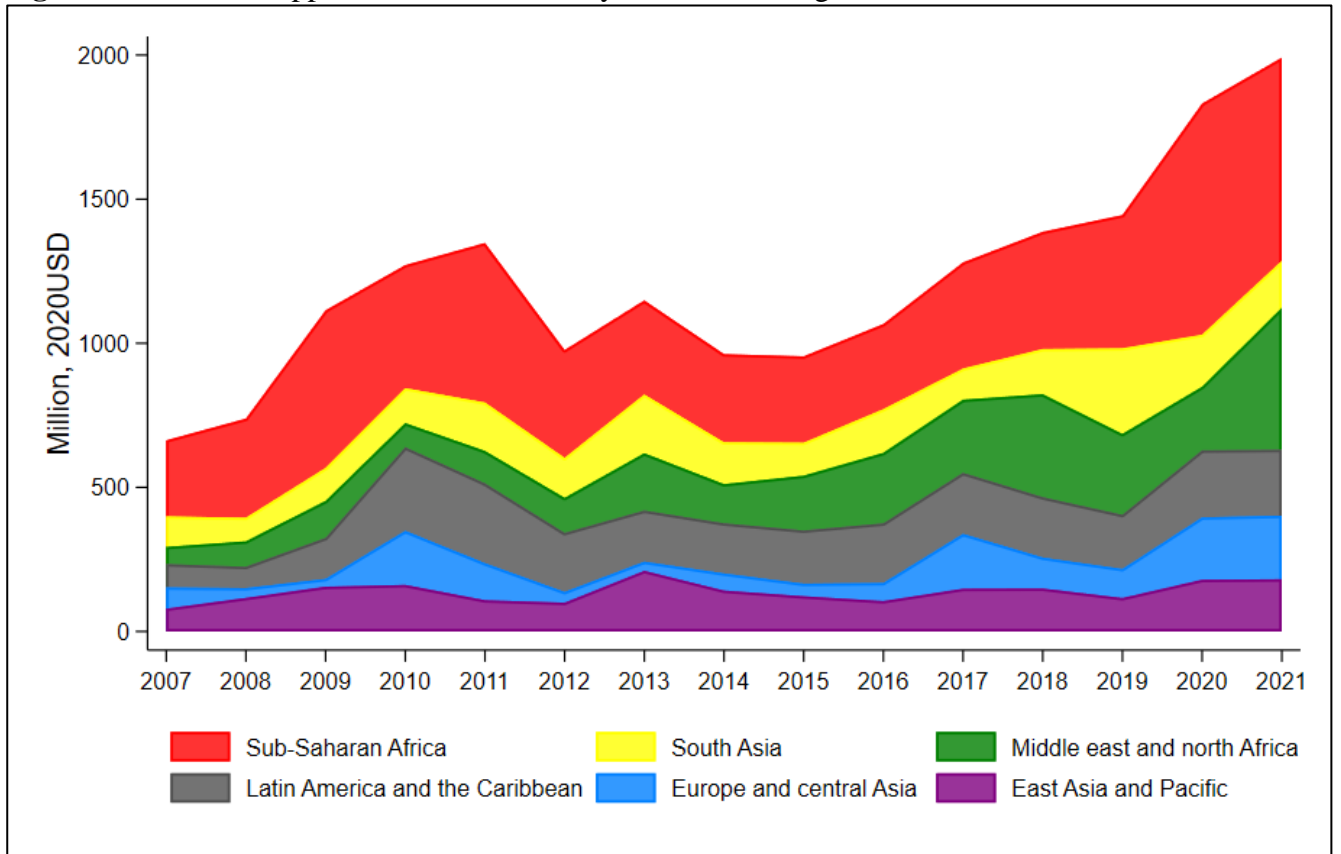
Figure A14. Upper-bound ECCE aid by sector, 2007-2021

Note: In this figure, we combined the sectors "Basic education", "Secondary education" "Post-secondary education", "Education, level unspecified" as "Education"; combined "Emergency response", "Conflict, peace & security", "Refugees in donor countries", "Reconstruction relief & rehabilitation", and "Disaster prevention & preparedness" as "Emergency and humanitarian"; combined "Health, general", "Basic health", "Non-communicable disease (NCDs)", and "Population policies/programmes & reproductive health" as "Health"; combined "Government & civil society-general", "Other social infrastructure & services", "Water supply & sanitation", "Energy policy", "Energy generation, renewable sources", and "Banking & financial services" as "Social and economic infrastructure".

44

Figure A15. Upper-bound ECCE aid by channel, 2007-2021
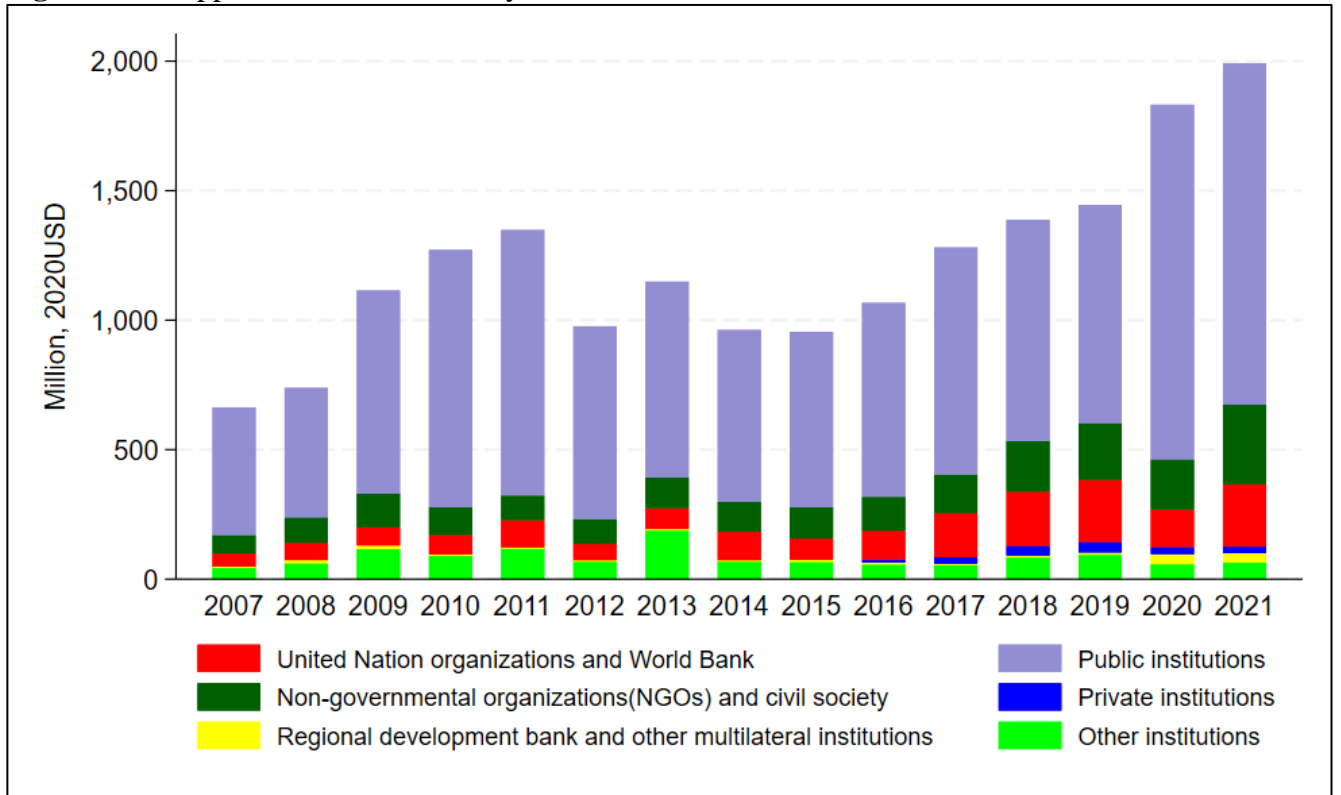
Figure A16. Top 10 and other donors of upper-bound ECCE aid, 2007-2021
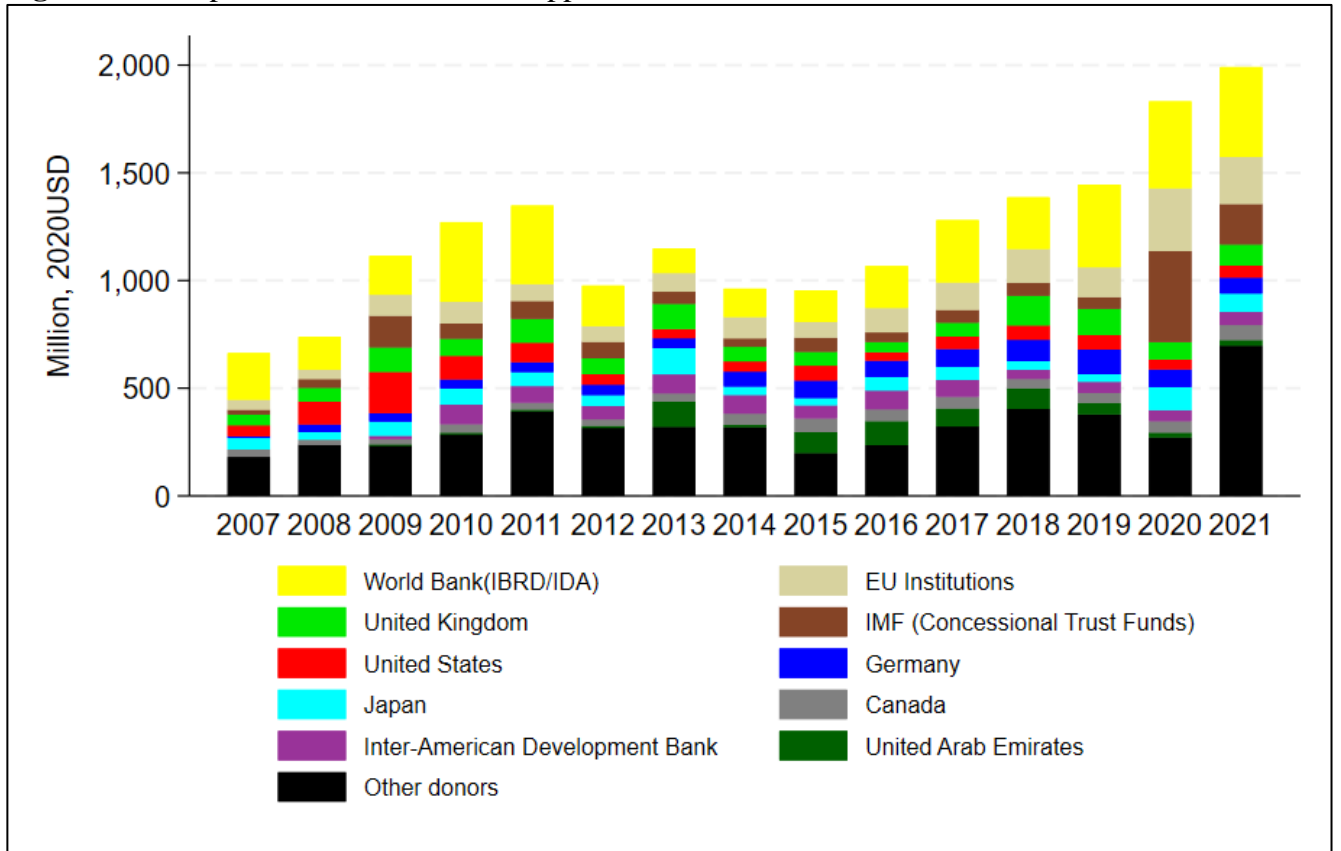
Figure A17. Top 10 and other recipient countries of upper-bound ECCE aid, 2007-2021
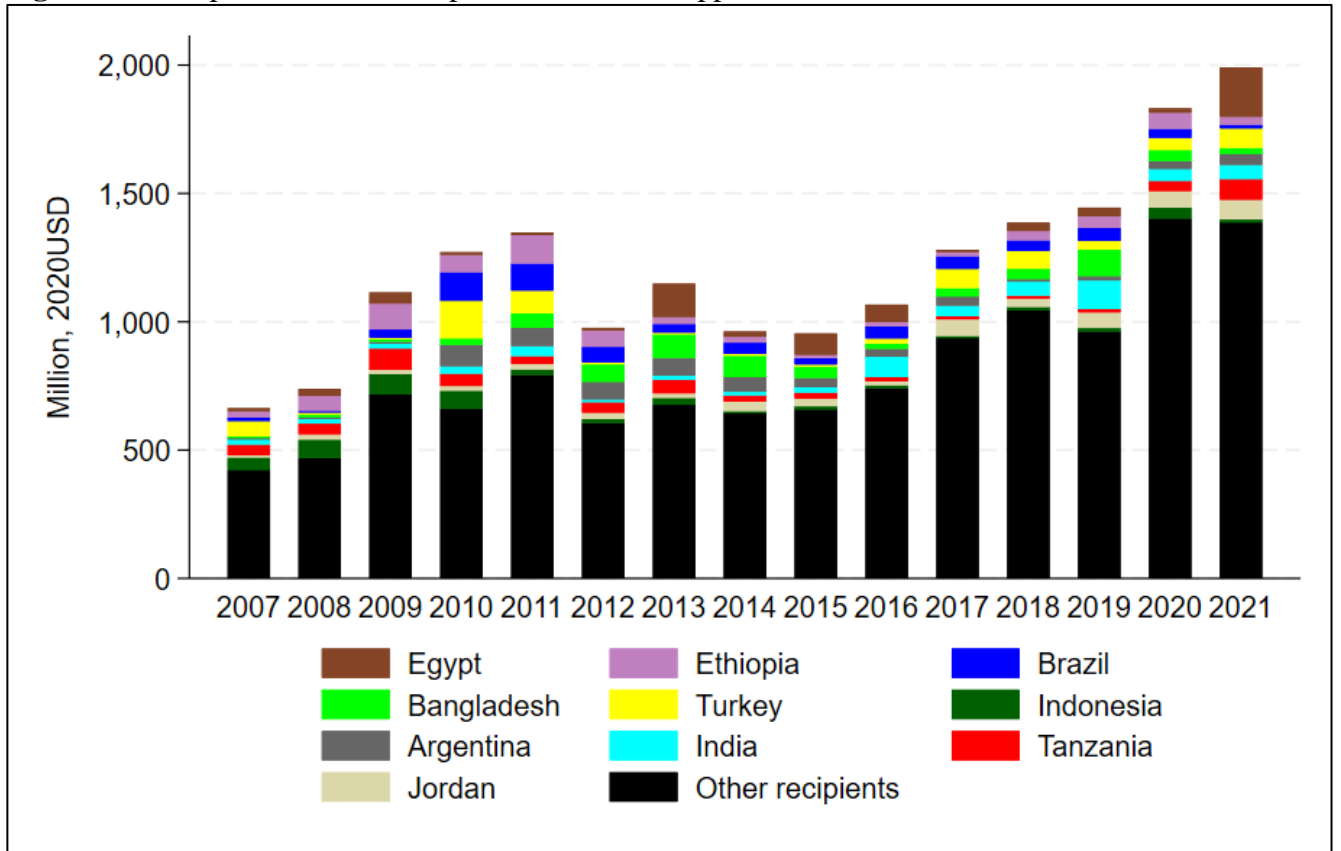
Figure A18. Average upper-bound ECCE aid per ECCE-age child among conflict-affected country versus non-conflict-affected country
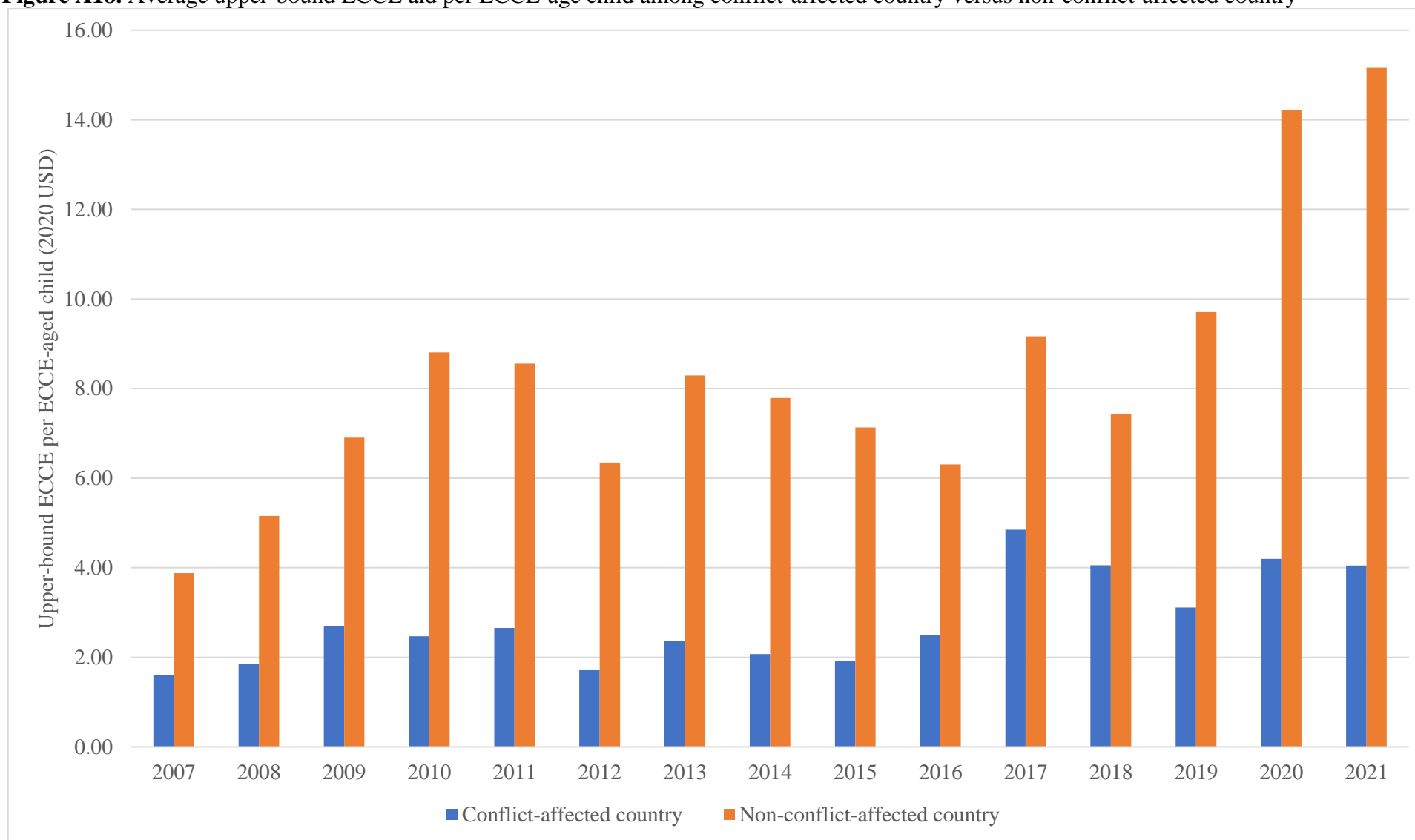
Text A1. Imputing missing data

1. Imputing missing data for ECCE-age population

We derived country-level ECCE-age population by summing up each country's number of eligible population for attending early childhood educational development program (ECED) and pre-primary education (PPE). Both population data were provided by UNESCO based on each country's regulations or laws on official entrance age and duration for ECED and PPE programs (see data sources in **Table A5 in Appendix**). Twenty-two countries have available population data for both ECED and PPE for each of the years between 2007 and 2021, while the rest of the 112 countries have missing population data within the study period (15 years). As the 112 countries are heterogeneous in data availability, we divided them into five groups and developed each group a strategy to impute their ECCE-age populations.

(1) Seventy-six countries do not have any population data for ECED but have available PPE population data for the 15 years

We imputed each country's ECED population data by evenly dividing each country's under-five population by five and replaced each country's missing with the country's population from age zero to its country-year-specific official PPE entrance age, with the assumption that all young children before the official PPE entrance age should be eligible for ECED programs. We obtained country-level annual data on under-five population from the United Nation Population Division (UNPD)[1] and country-year-specific PPE entrance age from UNESCO[2].

(2) Two countries have no population data for both ECED and PPE

Kosovo and Lebanon have neither population data for ECED and PPE nor data for PPE entrance age within the 15 years. We replaced their ECCE-age population with each country's under-five population derived from UNPD[1].

(3) Twenty-five countries have ECED population data for less than 15 years but have available PPE population data for 15 years

All these twenty-five countries have at least two years with available ECED population data, enabling us to follow previous studies in using linear interpolation or extrapolation to impute missing values[3]. We graphed the trend of each country's ECED population with available data points and visually examined data's linearity as it has been suggested as the condition under which the linear interpolation or extrapolation method would impute missing values with the most appropriateness[4]. The graph showed that most of the countries in most years followed approximately linear trends for their available ECED population data and the trends followed the patterns of most countries' under-five population well, validating our usage of the interpolation or extrapolation methods for imputing the missing data on ECED populations.

(4) Six countries have both ECED and PPE population data for less than 15 years

Of the six countries, Jamaica has only one available data point for its PPE population (in year 2007), where we imputed Jamaica's missing PPE population data by applying the same year-by-year growth rate of its under-five population. We imputed Jamaica's ECED and other five countries' ECED and PPE populations with the linear interpolation or extrapolation methods mentioned above, as these countries all have at least two available data points within the 15 years. After the imputation, we noticed that Bosnia and Herzegovina's imputed ECED population turned to be negative owing to the country's steep upward slope in its available data, and thus we changed

the imputation method for Bosnia and Herzegovina by applying the same year-by-year growth rate of its under-five population.

(5) Three countries have no ECED population data but have PPE population data for less than 15 years

Such countries include Maldives, Solomon Islands, and Vanuatu. Following practices in *(1)*, we imputed each country's ECED population data by evenly dividing each country's under-five population by five and replaced each country's missing with the country's population from age zero to its year-specific official PPE entrance age. We used linear interpolation and extrapolation to impute each country's missing PPE population as each country has at least two available PPE population data points within the 15 years.

Reference:

1. UNPD. Total population (both sexes combined) by five-year age group. https://population.un.org/wpp/Download/Standard/Population/ (Accessed date: February 20, 2023).

2. UNESCO. Official entrance age to primary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023)

3. Lu, C., Black, M. M., & Richter, L. M. (2016). Risk of poor development in young children in low-income and middle-income countries: an estimation and analysis at the global, regional, and country level. The Lancet Global Health, 4(12), e916-e922.

4. Armstrong, J. S. (1984). Forecasting by extrapolation: Conclusions from 25 years of research. Interfaces, 14(6), 52-66.

2. Imputing missing population data for higher-than-ECCE educational levels

51

The purpose of imputing missing population data for countries' higher-than-ECCE educational levels is to facilitate the fund allocation listed in **Table A5 in Appendix**.

(1) Primary education

Of the 134 LMICs, Bosnia and Herzegovina, Lebanon, and Kosovo do not have any years with available population data for primary education. We imputed missing values in the following ways: For Bosnia and Herzegovina, its entrance age for primary education remained at 6-years old while the education duration changed from four years in 2007-2009 (then attendees were of age 6-9) to five years in 2010-2021 (then attendees were of age 6-10)[1,2]. Thus, we imputed Bosnia and Herzegovina's missing population for primary education by 4*(5 to 9 aged population/5) for 2007-2009 and 4*(5 to 9 aged population/5) + (10 to 14 aged population/5) for 2010-2021. For Lebanon, its entrance age for primary education remained at 6-years old and education duration remained six years (then attendees were of age 6-12) from 2007 to 2021. Thus, we imputed Lebanon's population by 4*(5 to 9 aged population/5) + 3*(10 to 14 aged population/5). Kosovo does not have any data for entrance age and duration for its primary education, where we assumed that it starts at 6-years old and lasts for six years (then attendees were of age 6-11). Therefore, we imputed Kosovo's missing population by 4*(5 to 9 aged population/5) + 2*(10 to 14 aged population/5).

Besides, 10 countries have available population data for at least two years but less than 15 years for primary education, for which we visually examined their linearities for available data and used linear interpolation or extrapolation for imputations. Additionally, one country, Jamaica, has only one available data for its primary education population (for year 2007), where we imputed Jamaica's missing by applying the same year-by-year growth rate of its 5-9 aged population as Jamaica's official entrance age for primary education is at year six.

(2) Secondary education

Of the 134 LMICs, Bosnia and Herzegovina, Lebanon, and Kosovo do not have any years with available population data for secondary education. We imputed their missing values in the following ways: For Bosnia and Herzegovina, its entrance age for secondary education changed from 10-years old for 2007-2009 to 11-years old for 2010-2021 while its education duration remained eight years (then attendees were of age 10-17 for 2007-2009 and age 11-18 for 2010-2021)[3,4]. Thus, we imputed Bosnia and Herzegovina's population by (10 to 14 aged population) + 3*(15 to 19 aged population/5) for 2007-2009 and 4*(10 to 14 aged population/5) + 4*(15 to 19 aged population/5) for 2010-2021. For Lebanon, its entrance age remained at 12-years old and education duration remained six years (then attendees were of age 12-17). Thus, we imputed Lebanon's population by 3*(10 to 14 aged population/5) + 3*(15 to 19 aged population/5). Kosovo does not have any data for entrance age and duration for its secondary education, where we assumed that it starts at 12-years old and lasts for six years (then attendees were of age 12-17). Therefore, we imputed Kosovo's missing population by 3*(10 to 14 aged population/5) + 3*(15 to 10 aged population/5).

Besides, seven countries have available population data for secondary education for at least two years but less than 15 years, for which we visually examined their linearities for available data and used linear interpolation or extrapolation for imputations. Further, we noticed that Honduras has available data from 2007 to 2014 with 2014 seeing a jump in population owing to its change in education duration from five-years to six-years long, and the linear interpolation or extrapolation would overestimate missing values after 2014 if we treated the missing values as lying on a linear trend constructed by 2014 and prior years. Therefore, rather than the linear interpolation or extrapolation, we imputed Honduras's missing (2015-2021) by applying the same year-by-year growth rate of its 10-14 aged population as Honduras's official entrance age for secondary

education is at age of 12.

Additionally, one country, Jamaica, has only one year with available data (year 2007), where we imputed Jamaica's missing by applying the same year-by-year growth rate of its 10-14 aged population as Jamaica's official entrance age for secondary education is at the age of 12.

(3) Post-secondary non-tertiary education

We realized that the "post-secondary non-tertiary education" category is not applicable to every country-years, and a country's entrance age and duration variable for this education level would be attached with a "flag" in the UNESCO's database if the country did not provide "post-secondary non-tertiary education" in that year[5,6]. However, there are 16 country-years with available entrance age and duration values while population data missed, and these are the cases that we did imputations for. The 16 country-years include Bosnia and Herzegovina_2013-2018, Brazil_2020, Lebanon_2020, Lebanon_2021, Moldova_2008-2013, Solomon Islands_2020, and Vanuatu_2016. We used linear interpolation or extrapolation to impute these missing values except for Lebanon_2020 and Lebanon_2021 as Lebanon does not have any other available data before year 2021. As Lebanon sets its entrance age at 18-years old and a one-year-long duration, we replaced Lebanon_2020 and Lebanon_2021 with its 15-19 aged population size[7] after divided by five, respectively.

(4) Tertiary education

The UNESCO database does not have entrance age and duration data for tertiary education. Of the 134 LMICs, 37 countries have complete population data between 2007 to 2021 while the 95 countries have data for at least two years, and two countries (Kosovo and Lebanon) have no data for

the 15 years. For the 95 countries, we visually examined their linearities for available data and used linear interpolation or extrapolation for imputations. For Kosovo and Lebanon, we assumed that they start tertiary education at the age of 17 and then imputed their missing values by 2*(15 to 19 population/5) + (20 to 24 population).

Reference

1. UNESCO. Official entrance age to primary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

2. UNESCO. Theoretical duration of primary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

3. UNESCO. Official entrance age to lower secondary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

4. UNESCO. Theoretical duration of secondary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

5. UNESCO. Official entrance age to post-secondary non-tertiary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

6. UNESCO. Theoretical duration of post-secondary non-tertiary education. http://data.uis.unesco.org/# (Accessed date: February 20, 2023).

7. UNPD. Total population (both sexes combined) by five-year age group. https://population.un.org/wpp/Download/Standard/Population/ (Accessed date: February 20, 2023).

3. *Imputing country's proportion of government spending on education*

The World Bank database has available proportion of government spending on education for 28 studied countries between 2007 to 2021[1]. For countries with missing values during the study period, we imputed their proportion of government spending on education using different methods based on their data availabilities.

55

First, there were 10 countries without any data on the proportion of government spending on education between 2007 and 2021. We replaced their missing values with the year-specific average proportions of government spending on education of their country-income groups. Second, two countries have available data for only one year, in which case we replaced their missing values with their available data points. Third, 94 countries have available data points more than two years but less than 15 years. For these countries, we used the year 2015 – the year when the United Nation's Sustainable Development Goals (SDGs) were initially launched – as the cut point and calculated each country's average proportion of government spending on education for the periods of before and since 2015. We then replaced countries' missing values before or since 2015 with the calculated average values in the respective period.

Reference

1. World Bank. Government expenditure on education, total (% of government expenditure). https://data.worldbank.org/indicator/SE.XPD.TOTL.GB.ZS?view=chart (Accessed date: February 20, 2023)