International Labour Organization

ILO Care policy investment simulator

Technical note

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Abbreviations

AW	average earnings
ECCE	early childhood care and education
ECED	early childhood educational development (0-2 years old)
GDP	gross domestic product
HALE	healthy life expectancy age
LE	life expectancy
LTC	long-term care
MinW	minimum wage
NCU	national currency units
NCUm	national currency units in millions
Pre-prim	pre-primary education (3 years old and above)
ROI	return on investment
US$	United States dollars
US$m	United States dollars in millions

1. Introduction

This Technical Note provides guidance on how to use the online ILO Care Policy Investment Simulator by explaining the underlying methodology, calculations and results. The Simulator helps build tailor-made care policy investment packages to fill national gaps on care leave policies and services, as a means of advancing the ILO transformative agenda for gender equality and non-discrimination. As such, this note provides an overview of the online tool and its workings. First, it explains how the policy inputs are defined and can be modified by the user. Second, it shows how the input data are compiled for the tool. Third, it clarifies and demonstrates the calculations, as a way to help readers understand how the results are obtained. Lastly, it offers information and pointers on how to interpret the results. With this note and the ILO Simulator, users will appreciate that investing in care policies has the potential to generate decent work, close gender employment and wage gaps, and yield a return on investment.

2. Overview of the tool

The Care Policy Investment Simulator (available at: https://www.ilo.org/globalcare/) is an online policy modelling tool developed by ILO to simulate the investment opportunities and benefits present in filling national gaps in care services and childcare-related leave and advance the ILO transformative agenda for gender equality and non-discrimination. The tool enables users to build their ideal care policy package and simulate the country-level annual investments needed to realise the package, along with the plenty of benefits that would come as a result. The investment requirements are the amount of public spending needed each year to improve the national care system to the level chosen by the user. The benefits modelled are the short-term employment and earning effects of the investment, especially in terms of closing gender employment and wage gaps, and the resulting annual fiscal revenue. Here, the increase in employment stems from direct job increases in the care services industries where the investment takes place, indirect increases in supplying industries of the care sector and consumption-induced increases in the economy in general, since households of the newly employed would spend part of their increased earnings. For some policies, the tool also estimates a long-term return on investment (ROI), which is the increase in GDP (measured in US$) per dollar spent on early childhood care and education and paid childcare-related leave.

In the tool, four policy areas are considered:

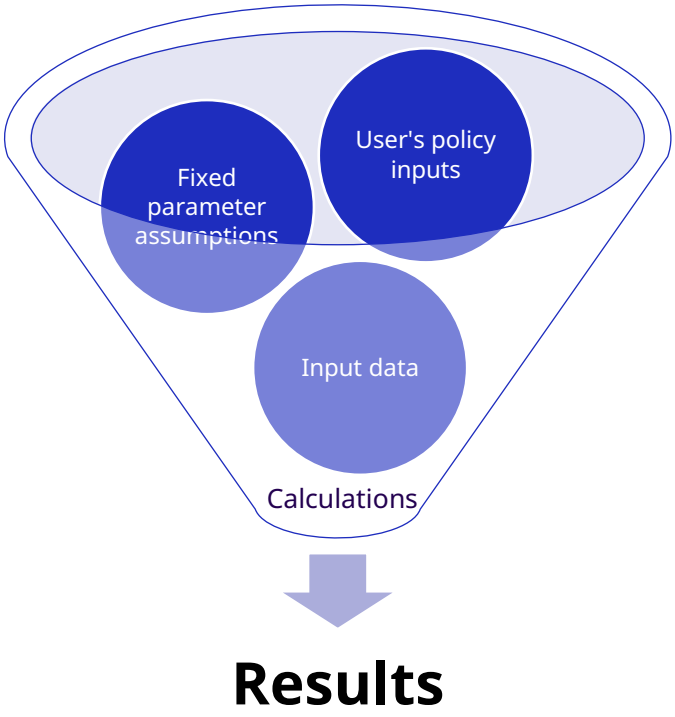
- **childcare-related paid leave (maternity, paternity and individual parental leave for mothers and fathers):** providing job-protected, adequately paid periods of leave to parents who want to care for their children at home, including health-related maternity leave;
- **paid breastfeeding breaks:** providing daily periods of paid breaks for employed mothers breastfeeding their child;
- **early childhood care and education services (ECCE):** providing near-universal free high-quality childcare to children under the age of compulsory school entry (two age groups: Early Childhood Educational Development (ECED) from 0 to 2 years and pre-primary from age 3 until the age of entry into primary school);
- **long-term care services (LTC):** providing adequate support to all persons (children, working-age adults, and older persons) who need daily support or care to maintain their autonomy and well-being.

3. How it works

The user can select a series of policy parameters, for each of the four policy areas, for a given year (2030 or 2035), to be compared with transformative policy scenarios compiled in the ILO *Care at Work* report (ILO 2022) and its related working paper (De Henau 2022a). The user will see the default policy parameters as those of the ILO scenario corresponding to the selected year and can modify each parameter within a list of predetermined options. The policy parameters selected enable the tool to calculate the annual public investment required for each policy, and the resulting employment, earnings, and fiscal effects.

The main building blocks of the tool are typical of most simulation tools, involving user choice of policy parameters (namely user's policy inputs), data inputs (namely input data) and the assumptions of the model that feed into a series of calculations (namely, fixed policy parameter assumptions), which in turn produce the various country-level results of annual investment, employment creation by gender, reduction of the gender wage gap and the return on investment (Figure 1).

▶ **Figure 1. How the Simulator works**



Source: Authors' illustration.

- **User's policy inputs:** contains the policy parameters within each of the four policy areas that the user can choose from. For example, the user can choose the number of days of paternity leave, the rate of payment of maternity leave, or the child/staff ratio in pre-primary education.
- **Fixed policy parameter assumptions:** contains a number of fixed policy parameters necessary for the investment calculations, which the user cannot change, mainly in order to keep the tool calculations manageable. These assumptions were determined through expert opinions based on the literature or typical data, including the use of international standards as well as regional and country-income group best practices. Examples include the number of weeks childcare facilities are opened per year, or the level of overheads (non-staff investments).
- **Input data:** contains all the data needed for the calculations for all 82 countries. This data set is compiled through three routes:

- *secondary (statistical) data:* obtained from official statistical offices and agencies (UN Population Division, ILOSTAT, WHO, UNESCO UIS, OECD, EUROSTAT, etc.), such as the proportion of women among pre-primary teachers or the prevalence of disability among adults over the age of 60;
- *micro-processed data:* country-level indicators obtained through processing micro-data from the ILO repository – mostly from national labour force surveys and equivalent, such as the employment rate of mothers aged 25-54;
- *input-output processed data*: country-level indicators obtained through processing national input-output (I-O) tables or social accounting matrices (SAM), yielding indicators such as the employment multiplier of the care industry that is used in the calculation of employment effects – see more details in section 6 below.

Detail on how each variable is obtained is given in the body of this document. Appendix Table A.1 also gives the source of micro-data and input-output tables for each country.

- **Calculations**: contains the main explanation of the calculations needed to provide the results, including intermediate results, based on the policy parameters chosen.
- **Results**: contains the main summary results calculated and several additional results derived from the main results for each policy area.

The following sections detail each of these blocks to illustrate the reasoning behind the calculations, a justification of the assumed parameters and inputs, and the sources of data.

4. User's policy inputs

The user's policy inputs are the parameters to be selected by the user for their country and projection year (2030 or 2035) of choice. The user can either retain the pre-set transformative ILO scenario with suggested policy inputs for the projected year – created based on international labour standards on care policies, the literature indicating relevant plausible values, and data on high-performing countries – or change the inputs based on national social dialogue or other criteria. Appendix 2 summarises the main parameters retained for each ILO scenario.

The user needs to select one country in the drop-down menu. They also need to select which year of projection their constructed scenario should apply to (2030 or 2035). The year chosen determines how far the baseline demographic and economic variables are projected. These will determine the baseline results that can be compared to the user scenario results (for example, additional employment created as a result of investing in care in 2035 compared to projected baseline employment in 2035 that follows population projections). Detail of the baseline projections can be found in the calculation section 6 below.

The policy inputs that the user can select are detailed below for each policy area. Each policy input includes a brief description in the simulator for ease of use.

4.1. Childcare-related leave user policy inputs

Childcare-related leave acts as an umbrella term for the more typically used terms maternity, paternity and parental leave. Box 1 details the main definitions and operational concepts for these policy areas, including some of the scoping restrictions the tool imposes on the policy modelling.

▶ **Box 1. ILO definitions and frameworks for maternity, paternity and parental leave (childcare-related leave) and breastfeeding breaks**

Maternity leave is the woman's right to a period of rest from work in relation to pregnancy, childbirth and the postnatal period. Maternity leave is a part of maternity protection which, as set out in the ILO Maternity Protection Convention, 2000 (No. 183), [1] also includes entitlement to maternal and child healthcare; prevention of exposure to workplace health and safety hazards for pregnant and nursing workers; protection against discrimination in employment and occupation; a guaranteed right to return to the job after maternity leave; and breastfeeding breaks. Convention No. 183, mandates a minimum leave period of 14 weeks for employed women – an increase from 12 weeks in previous Conventions [2] – which should be paid at a rate of at least two-thirds of the woman's previous earnings by compulsory social insurance or public funds. The ILO Maternity Protection Recommendation, 2000 (No. 191), further suggests that ILO Member States should try to increase the period of maternity leave to at least 18 weeks at full pay. Recommendation No. 204 concerning the Transition from the Informal to the Formal Economy states that *"[...] Members should progressively extend, in law and practice, to all workers in the informal economy, social security, maternity protection, decent working conditions and a minimum wage that takes into account the needs of workers and considers relevant factors, including but not limited to the cost of living and the general level of wages in their country*". [3]

Paternity leave is a care leave entitlement for fathers or partners of the birthing parents in relation to childbirth, which enables them to take a usually short period of leave around the birth of a child. Just like maternity leave, paternity leave is person-specific, and it is often associated with providing help and support to the mother and the newborn around childbirth as well as enabling fathers and co-parents to bond with their baby and to share unpaid care work. The 2021 International Labour Conference Resolution concerning the second recurrent discussion on social protection (social security) recognizes the importance of designing gender-responsive social protection policies, including by fostering income security during paternity and parental leave (ILO 2021b).

Parental leave tends to be a longer period of leave taken to care for the child beyond maternity or paternity leave and is typically available to one or both of the parents. Some countries now make available gender-neutral leave schemes (with no distinction between maternity, paternity and parental leave) and provide non-transferable portions of parental leave to each parent. The Workers with Family Responsibilities Recommendation, 1981 (No.

165),[4] and Recommendation No. 191[5] both contain provisions on parental leave. According to these Recommendations, a period of parental leave should be available to either parent after maternity leave without relinquishing employment and with their employment rights being protected. The duration and conditions of this leave period, as well as payment and other aspects, such as the use and distribution of parental leave between the parents, are not set by the Recommendations, but rather should be determined at the national level. [6]

Note: (1) Other relevant ILO standards are the Social Security (Minimum Standards) Convention, 1952 (No. 102), and the ILO Social Protection Floors Recommendation, 2012 (No. 202). (2) Other relevant ILO standards are the Social Security (Minimum Standards) Convention, 1952 (No. 102), and the ILO Social Protection Floors Recommendation, 2012 (No. 202). (3) Article 5(18). (4) Article 22. (5) Article 10(3–4). (6) Recommendation No. 191, Para. 10(3), and Recommendation No. 165, Para. 22(2). Source: ILO 2022.

For this policy input, the tool divides the male and female employed population into three categories of workers for the purpose of allowing different models of leave for each:

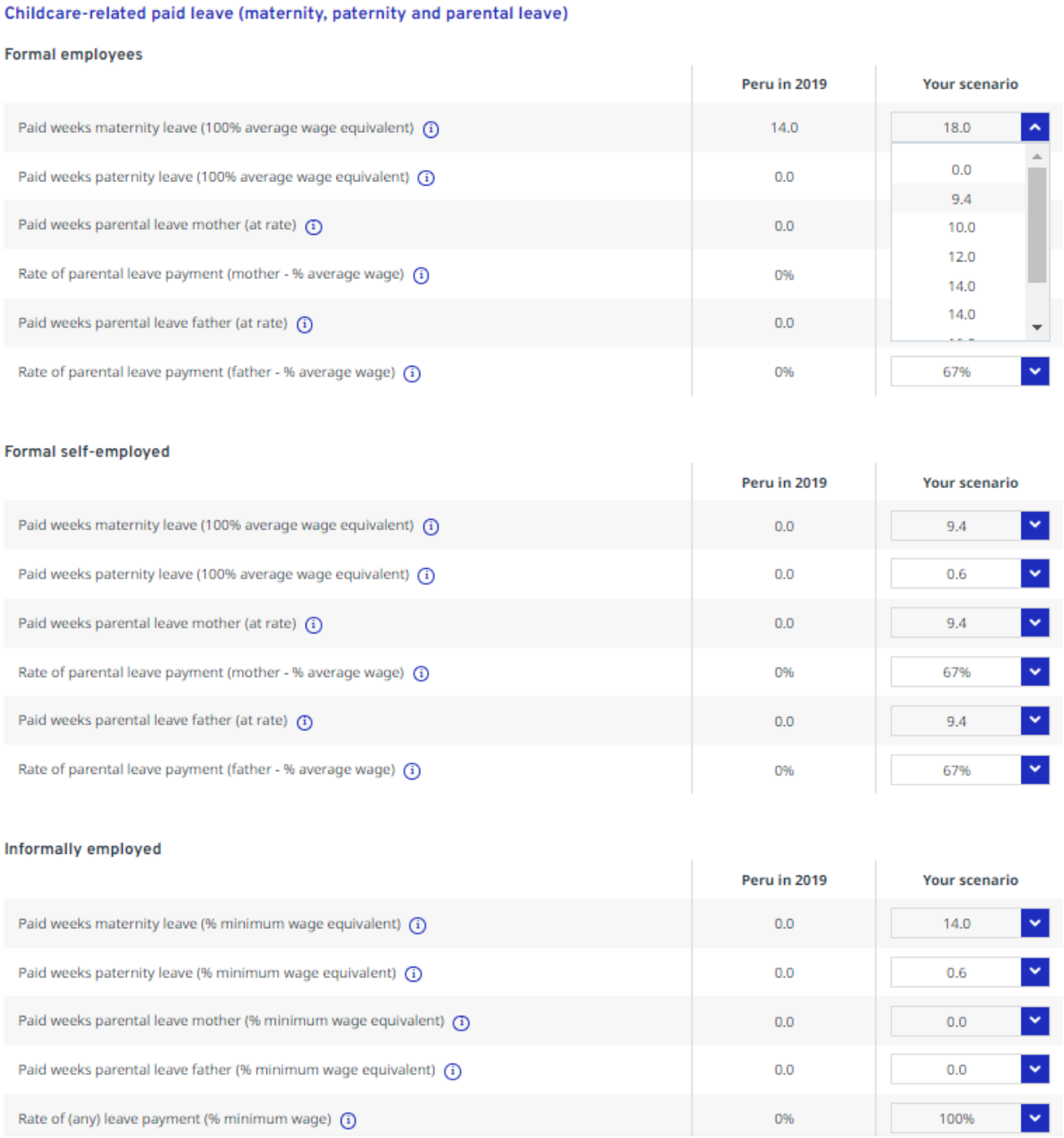
1. formal employee workers;
2. formal self-employed workers;
3. informally employed workers.

This distinction uses the ILO definition of informal employment (ILO 2018b; ILO 2021a), which is a job-based concept defined in terms of the employment relationship and the protections associated with the job of the worker (ILO 2021a). "*Informal employment refers to working arrangements that are de facto or de jure not subject to national labour legislation, income taxation or entitlement to social protection or certain other employment benefits (e.g., advance notice of dismissal, severance pay, paid annual or sick leave). Workers in informal employment are defined as those who work in informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households; including employees holding informal jobs; employers and own-account workers employed in their own informal sector enterprises; members of informal producers' cooperatives; contributing family workers in formal or informal sector enterprises; and own-account workers engaged in the production of goods for own end use by their household (based on the Seventeenth ICLS)*" (Ibid.).

The tool is built to provide a simple version of childcare-related leave policies, in contrast to the more complex systems that some countries offer, by harmonising as much as possible such differences, in particular taking into account decreasing payments over time or payment ceilings. The tool assumes that all workers in the same category (among the three above) are entitled to the same leave and cash benefits, covered exclusively by social insurance or public funds, without eligibility conditions, such as a minimum number of weeks in employment.

The tool calculates the gap in provision based on the current system, assumed to be the law in place in 2021 or thereabout. The tool creates the input data by using an extensive database of leave legislation compiled by the ILO and detailed in ILO (2022), which has harmonised country-specific statutory provisions on childcare-related leave, outlined in Figure 2 and Table 1. It then calculates the gap in care provision, which is the difference between the existing system and the policy parameters chosen by the user. An important feature of the tool is that the existing provision of paid leave only considers payments made by social insurance or public funds. If the current system entails more generous provision than the parameters chosen by the user for a particular category of workers and gender, the tool will calculate the required investment as zero, effectively maintaining the more generous current system to preserve social acquis (see section 6.1).

▶ Figure 2. Tool interface: Childcare-related paid leave



Note: All countries will appear as showing 2019 figures, because 2019 is the reference year for the Simulator (in terms of input data). However, data for childcare-related leave systems is the legislation in place in 2021 for most countries. Source: ILO Care Policy Investment Simulator, 2023, available at: https://www.ilo.org/globalcare/.

▶ Table 1. Childcare-related paid leave policy user parameters [1]

Formally employed (employee)	
Paid weeks maternity leave (100% average wage equivalent)	Duration in weeks of maternity leave paid at a 100% rate of the average wage. A maternity leave of 9.4 weeks (or more precisely 9.38 weeks) in 100% average wage equivalent corresponds to 14 weeks of maternity leave paid at 67%, as mandated in Convention No. 183.

Paid weeks paternity leave (100% average wage equivalent)	Duration in weeks of paternity leave paid at a 100% rate of the average wage. For paternity leave 0.6 weeks is equivalent to 3 days.
Paid weeks parental leave mother (at rate)	Duration in weeks of parental leave for the mother paid at the chosen rate of the average wage.
Rate of parental leave payment (mother - % average wage)	Rate of parental leave cash benefits for the mother (as a percentage of the average wage).
Paid weeks parental leave father (at rate)	Duration in weeks of parental leave for the father paid at the chosen rate of the average wage.
Rate of parental leave payment (father - % average wage)	Rate of parental leave cash benefits for the father (as a percentage of the average wage).
Formally employed (self-employed)	
Paid weeks maternity leave (100% average wage equivalent)	Duration in weeks of maternity leave paid at a 100% rate of the average wage
Paid weeks paternity leave (100% average wage equivalent)	Duration in weeks of paternity leave paid at a 100% rate of the average wage.
Paid weeks parental leave mother (at rate)	Duration in weeks of parental leave for the mother paid at the chosen rate of the average wage.
Rate of parental leave payment (mother - % average wage)	Rate of parental leave cash benefits for the mother (as a percentage of the average wage).
Paid weeks parental leave father (at rate)	Duration in weeks of parental leave for the father paid at the chosen rate of the average wage.
Rate of parental leave payment (father - % average wage)	Rate of parental leave cash benefits for the father (as a percentage of the average wage).
Informally employed	
Paid weeks maternity leave (% minimum in wage equivalent)	Duration in weeks of maternity leave paid at the chosen rate of the minimum wage.
Paid weeks paternity leave (% minimum wage equivalent)	Duration in weeks of paternity leave paid at the chosen rate of the minimum wage.
Paid weeks parental leave mother (% minimum wage equivalent)	Duration in weeks of parental leave for the mother paid at the chosen rate of the minimum wage.
Paid weeks parental leave father (% minimum wage equivalent)	Duration in weeks of parental leave for the father paid at the chosen rate of the minimum wage.
Rate of (any) leave payment (% minimum wage)	Rate of the leave cash benefit for informally employed parents (as a percentage of the minimum wage).

Note: (1) Paid weeks for parental leave (and for paid leave for informally employed workers) are measured 'at rate', that is at the payment rate selected by the user. Source: Authors, adapted from the ILO Care Policy Investment Simulator, 2023.

For example, the first input – 'paid weeks maternity leave (100% average wage equivalent)' – represents the amount of paid leave right an employed mother can claim from social insurance or public systems (therefore excluding non-paid leaves or leaves paid by the employer only). It is measured at the equivalent of 100 per cent of the average earnings of employees in the country (see section 5.1 for more details of how AW is calculated). Therefore, if a country offers 14 weeks paid at 67 per cent of an employee's earnings, the tool assumes this is equivalent to 9.4 weeks paid at 100 per cent of average wages, one of the numbers the user can choose in the drop-down menu. If a country offers 18 weeks at a flat rate of 800 NCU (national currency units) and the average wage is 1000 NCU, the flat rate is converted as a proportion of average wages (80 per cent) so that the 18 weeks paid at 80 per cent of average wages are equivalent to 14.4 weeks paid at 100 per cent of average wages. The same conversion is used to take account of leave policy payment ceilings if these are below the average wages.

The same method is applied to calculate paid weeks of paternity leave. Note that when paternity leave is measured in working days, a rule of 5 working days in a week was applied to convert days into weeks unless the country explicitly mentions otherwise (for example, Finland counts 6 working days in a week). If a country mentions consecutive days, then the tool assumes 7 days in a week.

For parental leave, Table 1 shows that the tool offers the user the possibility to separately define the leave duration and the level of payment. This is because the parental leave period that follows maternity leave often attracts lower payment rates. The assumptions about eligibility conditions and calculations of the payment rates are the same as

for maternity and paternity leave. To reflect the reality of parental leave take-up rates, any portion of parental leave that could be taken up by either parent was allocated to the mother only (See Koslowski et al. 2021, for examples).

The user can see both the current rule applied in the country of choice (in the sense of 2021 legislation or thereabout) and make a choice on the system they want to simulate for each policy parameter of Table 1, for each type of employment. By definition, informal employment has no provision for social insurance-based leave policy.

The user can choose any value in the range provided. As an illustration of a transformative policy package, the ILO scenarios have applied the following policy parameters to guarantee adequate leaves and sufficient time made available to look after a child before ECCE services take over:

- a minimum of 14 weeks of maternity leave paid at 67 per cent of AW, progressively moving to 18 weeks paid at 100 per cent (for example, 14 weeks in 2030 and 18 weeks by 2035);
- a few days of paternity leave if none is provided, and gradually tending towards the region's best performing country[1], then gradually moving towards equalising the leave with mothers (for example, towards 18 weeks at 100 per cent AW for each parent);
- the informally employed receive 14 weeks of maternity leave and 0.6 weeks of paternity leave paid at 100 per cent of minimum wage in 2030, and no parental leave. By 2035, both parents receive 14 weeks at minimum wage.

Then, the Simulator progressively extends paid parental leave to both formally employed parents covering between 50 and 100 per cent of the remaining childcare policy gap (that is the time between the end of adequately paid leave and the start of universal ECCE services), as follows:

- for countries whose target for maternity leave is 14 weeks at 67 per cent AW, parental leave is calculated as 50 per cent of the remaining gap after the end of both maternity and paternity leave (assuming no overlap between the two), paid at 67 per cent of AW and equally split between parents;
- for countries whose target for maternity leave is a minimum of 18 weeks at 100 per cent AW, parental leave is calculated as up to 100 per cent of the remaining gap after the end of both maternity and paternity leave (again assuming no overlap between the two), also paid at 67 per cent AW and equally split between parents, progressively moving to covering 100 per cent of the childcare policy gap by 2035.

For example, in Morocco the current system provides 14 weeks of maternity leave, paid at 100 per cent AW up to a ceiling, through social insurance. This is followed by 52 weeks of unpaid parental leave (with no father's quota, so it is assumed to go entirely to the mother). Therefore, the total paid leave for mothers is calculated as the equivalent of 14 weeks at 100 per cent AW (=14 x 100 + 52 x 0). Fathers receive 3 days of paternity leave paid at 100 per cent AW (which is 0.6 weeks of fully paid paternity leave).

Therefore, the ILO scenarios for Morocco are:

- maternity leave: 18 weeks at 100 per cent AW (the higher target given that the provision already covers 14 weeks at 100 per cent AW);
- paternity leave: 1.32 weeks at 100 per cent AW in 2030 (following the region's best performing country,[2] which is South Africa), then 18 weeks at 100per cent AW for the 2035 target;
- parental leave for each parent: 8 weeks at 67 per cent AW to cover 100 per cent of the childcare gap by 2035 when taken without overlap.

The interested reader can see the exact rules applied to the ILO scenarios in Appendix Table A.2. Note that the tool assumes that none of the provisions of maternity, paternity and parental leave overlap with one another for the

[1] The regional best performing countries for paternity leave were (in 100 per cent AW equivalent): Africa and Arab States – South Africa: 1.3 weeks; Asia and the Pacific – Myanmar: 2.1 weeks; Americas – Venezuela: 2.8 weeks; Central Asia – Bulgaria: 2.7 weeks; Europe – Spain: 16 weeks. Note that for the high-income European countries that do not have any paid paternity or parental leave for fathers (namely Malta and Israel), the ILO scenario for 2030 provides 2.7 weeks at 100% AW (benchmarked on Bulgaria) rather than just 3 days, to illustrate greater capacity for faster progression.

[2] The regional best performing countries for paternity leave were (in 100 per cent AW equivalent): Africa and Arab States – South Africa: 1.3 weeks; Asia and the Pacific – Myanmar: 2.1 weeks; Americas – Venezuela: 2.8 weeks; Central Asia – Bulgaria: 2.7 weeks; Europe – Spain: 16 weeks. Note that for the high-income European countries that do not have any paid paternity or parental leave for fathers (namely Malta and Israel), the ILO scenario for 2030 provides 2.7 weeks at 100% AW (benchmarked on Bulgaria) rather than just 3 days, to illustrate greater capacity for faster progression.

purpose of calculating the childcare policy gap to cover, although countries might enable some overlap between maternity and paternity leave. The tool calculations are not affected by more flexible arrangements in practice, including in terms of part-time instalments of parental leave accompanying the partial use of ECCE services.

The default parameters of the ILO scenario shown are the minimum target to achieve per type of worker and gender, even for countries with more generous provision. For these countries the tool preserves the current provision to maintain the social acquis and sets the investment to zero as a result.

4.2. Breastfeeding breaks user policy inputs

The second group of policy inputs refer to the provision of paid breastfeeding breaks funded by compulsory social insurance or public funds. Box 2 details the main definitions and operational concepts for this policy area.

▶ Box 2. ILO definitions and frameworks for breastfeeding breaks

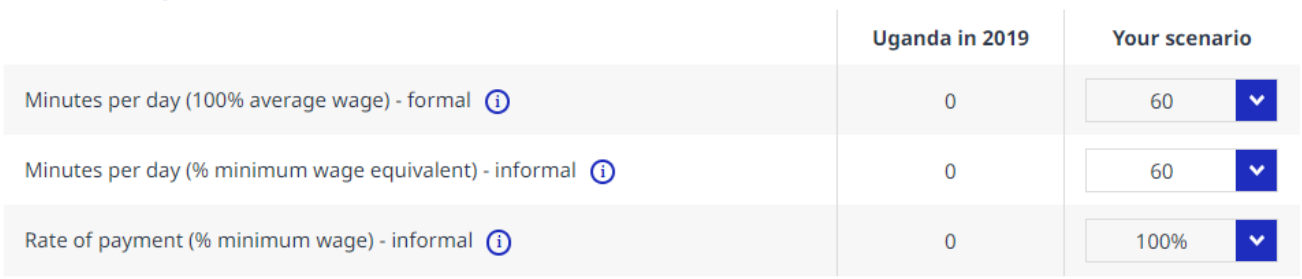
Breastfeeding arrangements help women to breastfeed or express milk at the workplace for a period after returning to work. Convention No. 183 sets out that women workers should be provided with the right to one or more daily nursing breaks (or a daily reduction of working hours), which should be counted as working time and remunerated accordingly. The period during which nursing breaks or the reduction of daily hours of work are allowed, their number, the duration of nursing breaks and the procedures for the reduction of daily hours of work shall be determined by national law and practice (Article 10).

The tool models care leave policies that are paid by mandatory social insurance or public funds only, to ensure universality of coverage. Therefore, periods of leave or breastfeeding breaks paid for by employers are not considered as funded.

Source: Convention No. 183, Article 10(1–2).

Figure 3 shows the tool interface for choosing breastfeeding breaks parameters.

▶ Figure 3. Tool interface: Breastfeeding breaks



Source: ILO Care Policy Investment Simulator, 2023, available at: https://www.ilo.org/globalcare/.

▶ Table 2. Breastfeeding breaks policy user parameters

Minutes per day (100% AW) - formal	Total daily nursing break duration in minutes for formally employed women paid at a 100% rate of the average wage.
Minutes per day (% min W equiv.) - informal	Total daily nursing break duration in minutes for informally employed women paid at the chosen rate of the minimum wage.
Rate of payment (% min W) - informal	Rate of payment for informally employed (as a percentage of the minimum wage). (1)

Note: (1) Poverty line equivalent is the country-specific level of its poverty line converted in per cent of minimum wage. See section (5.1) for sources.
Source: Authors, adapted from the ILO Care Policy Investment Simulator, 2023.

Data on current provision, also compiled by the ILO (ILO 2022), shows that only Spain, Croatia and Slovenia had social insurance-based provision for breastfeeding breaks among the 82 countries covered by the tool. Most of

other countries had legal provision for breastfeeding breaks, however these were paid for by employers. Therefore, those countries were considered as not providing paid breaks.

Although the user can choose different values in the range suggested, the benchmark ILO scenarios have considered 6 months of nursing breaks for 60 minutes per day - paid at 100 per cent of the average wages for the formally employed and at minimum wage for the informally employed – in line with international standards to provide one or more paid daily nursing breaks (see Box 2). The period of 6 months illustrates the recommended period of exclusive breastfeeding (WHO 2021), along with the continuation of adequate complementary breastfeeding for up to 2 years and beyond after the 6-month period. It also reflects the prevalent provisions in national legislation, since 109 countries offer the right to daily nursing breaks for 6 months or more (ILO 2022).

4.3. Early childhood care and education user policy inputs

As explained in Box 3, early childhood care and education (ECCE) services are modelled in the tool as centre-based facilities. In practice, to meet different national circumstances, the user has the possibility to construct a system that combines different levels of centre-based and community-based settings (akin to licensed homebased childminders), by choosing the proportion of early childhood educators for each age group (ECED and pre-primary), respectively.

▶ Box 3. ILO and international frameworks and key operational concepts related to early childhood education and care (ECCE)

The Workers with Family Responsibilities Convention, 1981 (No. 156) calls for the development of childcare services and facilities as part of the measures to ensure equal opportunity and treatment to workers with care needs. According to the related Recommendation No. 165, childcare services should also be developed along flexible lines and meet the needs of children of different ages as well as the needs and preferences of workers with family responsibilities. In addition, childcare services should be adequate, appropriate, and offered free of charge or at a reasonable charge in accordance with workers' ability to pay (Paragraphs 24; 25).

Early childhood care and education (ECCE) services and programmes are broadly classified into two types: 1. early childhood educational development (ECED) programmes designed for children in the age range of 0–2 years; and 2. pre-primary education programmes designed for children from 3 years of age to the start of primary education (ILO 2018a).

According to the ILO Policy Guidelines on the promotion of decent work for early childhood education personnel, for the purposes of the Simulator, these programmes "*are usually school-based or otherwise institutionalized for a group of children (for example, centre-, community- or home-based), excluding purely private family-based arrangements that may be purposeful, but are not organized in a programme (for example, care and informal learning provided by parents, relatives, friends or domestic workers)*" (ILO 2014).

ECCE personnel includes, among others,: (a) all teachers and educators with pedagogical qualifications, as set by the relevant education authority for their particular job category, and who are responsible for learning, education and care activities of young children; (b) managers or leaders – personnel who manage or lead an ECCE workplace on their own behalf, or on behalf of an employer; they may or may not be employed to also teach or engage in learning support activities; (c) professional specialists, care workers, nurses and other auxiliary staff with professional qualifications according to national or subnational authority licensing provisions; (d) teaching assistants and similar personnel providing pedagogical support to qualified staff. For the purposes of the Simulator, investments in categories (a) and (d) as well as "other staff" are modelled (see Table 3).

The ILO 2014 Guidelines also indicate that remuneration of ECCE personnel "*should be set at the same level as the equivalent job in primary education with similar qualifications and competency requirements (comparator professions), whether through separate or unified salary scales; (d) remuneration levels should correspond to the responsibilities of the ECCE job (competencies and skills required) as set out in job descriptions objectively defined through systematic evaluation or appraisals of the work to be performed; (e) equal remuneration for men and women workers for work of equal value*" (ILO 2014). Similar recommendations on remuneration levels were adopted by the World Conference on Early Childhood Care and Education in the Tashkent Declaration and Commitments to Action for Transforming

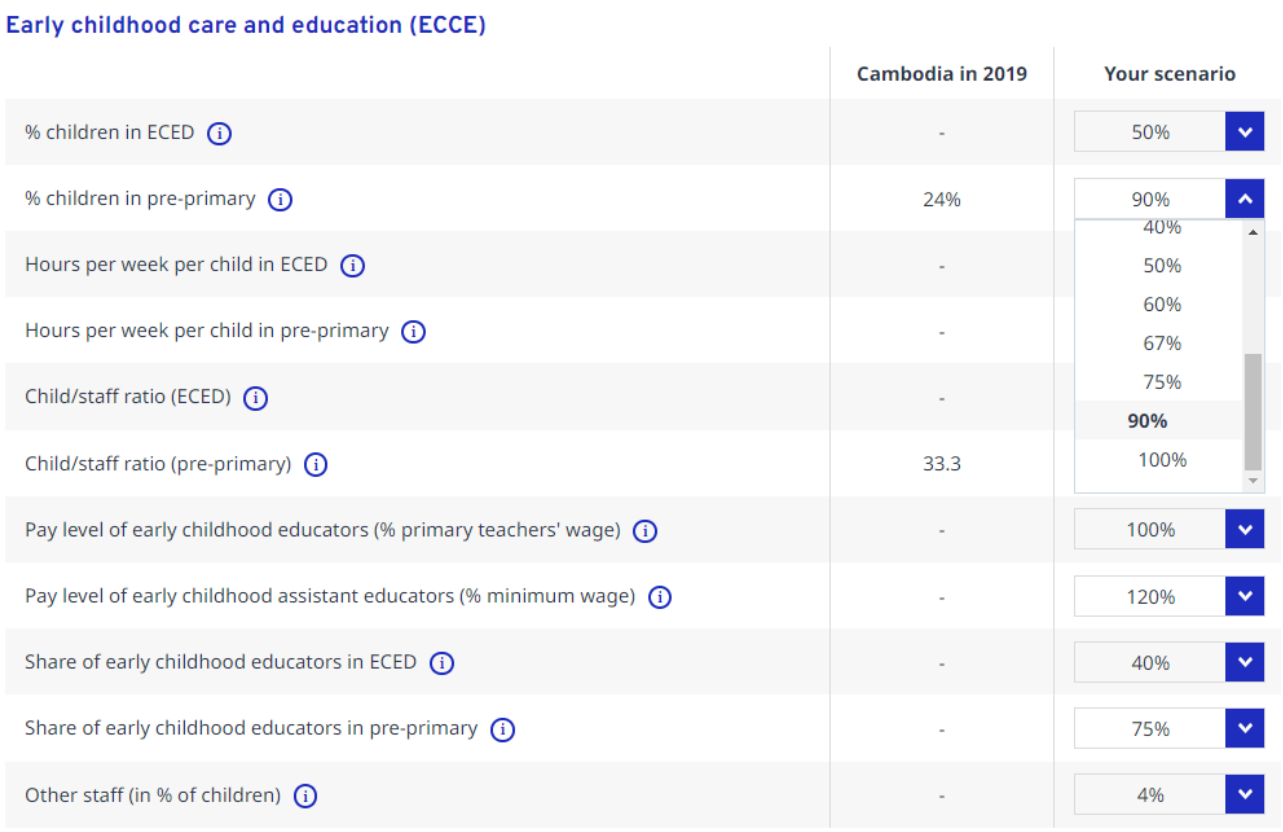
Early Childhood Care and Education (2022), which sets out that "*The wages and working conditions of ECCE personnel should be at least on a par with those of primary education teachers, and contractual conditions should be stable and provide pathways for career growth. Promoting the organization and representation of ECCE personnel as well as their right to social dialogue and collective bargaining can play an important role in promoting decent work for ECCE personnel*" (UNESCO 2022).

Hence, with the aim of ensuring ECCE is accessible and of quality for everyone, the tool only models institutionalized childcare provision in centre-based or community settings (home-based professional childminders) for both of the above age groups. The tool also assumes ECCE services are free at the point of use in the sense that the amount of public funds invested in the scheme cover all the costs to run it. Finally, to ensure both decent work and high quality of ECCE, the Simulator considers number, remuneration and qualification of ECCE staff according to the above guidelines.

Source: Convention No. 156; Recommendation No. 165; ILO 2014; ILO 2018a; ILO 2022; UNESCO 2022.

Early childhood educators are assumed to be qualified at degree-level or at the same level as primary school teachers, following national specificities. Therefore, the user inputs shown in Table 3 offer a limited range of pay levels for educators, in proportion of primary school teachers' salaries. Data sources and imputation for pre-primary and primary school teachers' salaries are explained in section 5.1 (reference salary for teachers). Early childhood assistant educators are assumed to have lower qualifications than early childhood educators, reflected in their remuneration level. They are trained to acquire pedagogical and developmental child-facing skills at a level equivalent to one or two years post-secondary education.

▶ **Figure 4. Tool interface: Early Childhood Care and Education**



Source: ILO Care Policy Investment Simulator, 2023, available at: https://www.ilo.org/globalcare/.

▶ Table 3. ECCE policy user parameters

% children in ECED	Percentage of children aged 0-2 years enrolled in early childhood educational development services (ECED).
% children in pre-primary	Percentage of children aged 3 years and above enrolled in pre-primary education services.
Hours per week per child in ECED	Opening hours of facility per week in early childhood educational development services for children aged 0-2 years.
Hours per week per child in pre-primary	Opening hours of facility per week in pre-primary education services for children aged 3 years and above.
Child/staff ratio (ECED)	Number of children per staff (averaged across early childhood educators qualified at the same level as primary school teachers or with pedagogical qualifications as set by the relevant national/subnational authority and early childhood assistant educators) in early childhood educational development services for children aged 0-2 years.
Child/staff ratio (pre-primary)	Number of children per staff (averaged across early childhood educators qualified at the same level as primary school teachers or with pedagogical qualifications as set by the relevant national/subnational authority and early childhood assistant educators) in pre-primary education services for children aged 3 years and above.
Pay level of early childhood educators (% primary teachers' wage)	Payment level of early childhood educators qualified at the same level as primary school teachers or with pedagogical qualifications as set by the relevant national/subnational authority as a percentage of primary teacher's wage.
Pay level of early childhood assistant educators (% minimum wage)	Payment level of early childhood teaching assistants and similar personnel providing pedagogical support to qualified staff as a percentage of the minimum wage.
Share of early childhood educators in ECED	Proportion of teachers and educators who are qualified at the same level as primary school teachers or with pedagogical qualifications as set by the relevant national/subnational authority among educators interacting with children in early childhood educational development services for children aged 0-2 years.
Share of early childhood educators in pre-primary	Proportion of teachers and educators who are qualified at the same level as primary school teachers or with pedagogical qualifications as set by the relevant national/subnational authority among educators interacting with children in pre-primary education services for children aged 3 years and above.
Other staff (in % of children)	Other staff in the facility who do not directly interact with children (i.e. they are not counted in the child/staff ratios), such as cleaners, maintenance staff, manager, cooks. The proportion is given as a percentage of children in the facility.

Source: Authors, adapted from the ILO Care Policy Investment Simulator, 2023.

Data for 'current' (namely, 2019) provision of ECCE services, broken down by the indicators shown in Table 3, are not systematically harmonized nor available for all the 82 countries covered by the tool and are shown only for indicative purpose. For example, data on the proportion of children enrolled in ECED or pre-primary school is based on EU-SILC for Eurostat countries (Eurostat, n.d.), based on questions about non-parental formal care for children in each age group, which can include registered childminders (family day care). Whereas for the non-Eurostat countries with data only available from the OECD education database (OECD, n.d.) or UNESCO UIS database (UIS, n.d.), the focus is on educational establishments only (centre-based provision). Moreover, many countries had data for pre-primary children only and in the case of data only available in UNESCO UIS (n.d.), enrolment rates were gross, thereby overestimating the number of children of the expected age to be enrolled in the corresponding facility. For example, gross enrolment rates in pre-primary schools count, in the numerator, all children registered in pre-primary settings, even if some of them are younger than the expected age (or older and should be in primary school), while the denominator only counts the population of children of the relevant age group (for example, 3–5-year-olds).

Data on opening hours and child/staff ratios that count both teachers and assistants are only available for Eurostat countries. Data on child/staff ratios for other countries, taken from either OECD (n.d.) or UNESCO UIS (n.d.) are for ratios of children per teacher (what the tool calls 'early childhood educators'). A ratio of 10 could mean that 10 children are looked after by a teacher and that is the only person present. It could also mean that the data only counts the teachers present, but not early childhood assistant educators. So, there may well be another person present (an 'early childhood assistant educator' as the tool calls them), which would mean that the child/staff ratio is in fact 5 children per staff, but only 50 per cent of the staff is comprised of early childhood educators, qualified at degree-level. Therefore, the indicator of '% of early childhood educators' (the proxy for 'teachers') is 100 per cent in some countries for which only child/teacher ratios data was available. It should be understood as the ratio of children per teacher, not the ratio of children per any staff interacting directly with them, since not all staff are teachers/early childhood educators, in practice. Again, these indicators should only be seen as tentative, incomplete, descriptions of current systems on certain key aspects.

Data on pay levels of early childhood educators (taken as the pay-level of pre-primary teachers) is only available for some OECD countries, and there is no international data available for the level of pay of early childhood assistant educators, except for data from Norway, Sweden and Denmark (Norway, n.d.; Sweden, n.d.; Denmark, n.d.). These three countries also had more detailed data on the share of early childhood educators and assistant early childhood educators (Norway, n.d.; Sweden, n.d.; Denmark, n.d.; and Jensen 2017).

There is no data available about the proportion of other staff (cooks, cleaners, etc.) in current formal facilities although country-specific studies in Turkey and the UK suggest a proportion of about 4 and 6 per cent (See Kim et al. 2019 and De Henau 2022b, respectively), which determined the range of values for the user to select from.

Appendix Table A.4 shows the ECCE policy parameters retained for the ILO scenarios of 2030 and 2035.

4.4. Long-term care user policy inputs

For long-term care services, the model assumed is predominantly one of community-based (including in-home support or care), even though residential care can be seen as a prolongation of community-based care (in a continuum of housing arrangement), often for people with a higher degree of care needs. As it is difficult to model the right mix of community-based and residential care provision, the tool assumes a hybrid model of continuum support or care, but does not intend to calculate building investments, implicitly focusing on community-based care or support only without excluding those with greater needs. Ignoring accommodation and food (sometimes called 'hotel') investments of residential care also corresponds to many funding models whereby the focus of public funding is on the 'care' component (that is the support in activities of daily living), leaving accommodation costs to be charged to the user, or subsidized for lower-income residents as part of other social security protection schemes (housing assistance) (see Lipszyc et al. 2012, for more discussions). Box 4 details the main international frameworks, definitions and operational concepts for this policy area.

▶ Box 4. ILO and international frameworks and key operational concepts related to long-term care services

The ILO Workers with Family Responsibilities Convention (No. 156) and Recommendation (No. 165), 1981 call for the adoption of measures to take into account the needs of workers with family responsibilities in community planning, as well as to develop or promote community services, such as "family services and facilities" in relation to other members of their immediate family who need their care or support. Accordingly, long-term care services are essential measures both to ensure the right of older persons to healthy ageing and of persons with disability to independent living as well as to enable workers with family responsibilities – both women and men – to exercise their right to engage in employment without discrimination and, as far as possible, without work–family conflict.

International labour standards on social security call, among others, for the principles of universality of protection based on social solidarity; person-centred, high-quality, accessible and affordable public services; adequacy, predictability and entitlement of benefits in national legislation; as well as solidarity in financing (ILO 2022). The ILO and WHO also recommend that governments do not need to deliver the entirety of service provision but should take "*overall and primary responsibility" for ensuring long-term care service functioning, so that "integrated*

long-term care that is appropriate, affordable, accessible and upholds the rights of older people and caregivers alike" is guaranteed (ILO 2018a; WHO 2017).

Long-term care services include support or assistance to older persons, adults and children with functional limitations to enable them to carry out activities of daily living (personal care), such as bathing and eating, as well as activities that are instrumental to achieving personal care, such as maintaining a clean household, cooking, dealing with administrative tasks or socializing, and enabling participation in employment and society without discrimination. Typically, long-term care services also include basic medical support. These services are provided by nurses as well as non-health professionals, including "personal assistants or personal care workers" and domestic workers.

An important acknowledgement is that functional limitations can result from a disability or the process of ageing. Disability is a complex, dynamic and multidimensional concept, with both a medical and a social component. It is an umbrella term for impairments, activity limitations and participation restrictions, referring to the various barriers that may result from the interaction between an individual with long-term impairments (physical, mental, intellectual or sensory) and that individual's contextual factors (environmental and personal). "Care dependency" is a functional dependency and differs from "disability" in that the latter concept is grounded on the relation between a certain impairment and the environmental and cultural barriers that prevent people with disabilities' full, effective and equal participation in society. It is worth noting that not all people with disabilities have a care dependency, while all have the right to independent living and to choose and access different types of services, including personal assistance, as set out in the UN Convention on the Rights of Persons with Disabilities.

Long-term care services can be provided in community-based or in institutional residential settings. Community-based care refers to all forms of care that do not require older persons or persons with disabilities with a care dependency to reside permanently in an institutional care setting; they include in-home care, community centres and day centres. Institutional residential care refers to institutionalized care delivered in assisted-living facilities and nursing homes. Additionally, respite care provides short-term care in order to relieve unpaid carers. It can occur in people's homes as well as in community and day centres or residential facilities.

Long-term care services can be provided in-kind or in-cash (or a combination of both). Under the first method, in-kind, beneficiaries receive services from the public sector, not-for-profit, or private providers or a mix thereof, fully or partially compensated by the State (through non-contributory or contributory systems, such as social insurance). In the second scenario (cash-for-care schemes), beneficiaries receive transfers that can either be spent on long-term care services provided by paid care workers (either in-home or institutions), or to be used as they see fit, including compensating for unpaid care services provided by family members. The tool models in-kind services only, that is the investment of providing care services directly rather than the cash that could be transferred to users to compensate unpaid carers. It is expected that this modality is more likely to allow women – who cover most of long-term care needs - to remain attached to the labour market with increased earnings. However, the tool assumes that the investments and employment effects between the two modes of delivery (in-kind and in-cash) would be equal, as long as there is adequate pay, training and working conditions for the LTC worker being compensated. The tool also assumes that long-term care services are free at the point of use in the sense that the amount of public funds invested in the scheme cover all the costs to run it.

Source: ILO 2018a; ILO 2022; WHO 2017.

Figure 5 and Table 4 summarize the main policy input parameters the user can choose from.

Three age groups are considered, but the user is only requested to select parameters for the two age groups of adults (15-64y and 65y+), such as recipient-to-carer ratios – the number of recipients per LTC personal care worker and other LTC workers. Children's care staffing is assumed to be a fixed proportion of adult care staffing (see fixed parameters in section 4 below).

Note that 'other LTC workers' are those care workers assisting personal care workers, or providing supporting indirect care, for example for household tasks, such as cleaning, preparing or delivering meals, without or with lower professional qualifications than the main personal care workers, reflected in remuneration level. In practice, the system may be more complex with different tasks provided by the same or different people. The point is that the user can select the proportion of personal care workers in the policy inputs mainly as a way to vary the

qualification mix of the LTC system staff. This is to reflect different national circumstances and a progressive approach toward building a skilled care workforce with decent work. For example in the 2035 ILO scenario, the simulated LTC system of upper-middle income and high-income countries assumes that 100 percent of LTC staff is composed of personal care workers (performing both personal direct and indirect care) whereas the system of lower-middle and low-income countries is assumed to have 67 per cent of LTC staff composed of personal care workers and 33 per cent of other LTC workers, resulting in a mix of qualifications and remuneration levels, to reflect the larger skill investment effort needed in these countries.

▶ Figure 5. Tool interface: Long-term care

Source: ILO Care Policy Investment Simulator, 2023, available at: https://www.ilo.org/globalcare/.

▶ Table 4. LTC policy user parameters

Recipient-to-carer ratio 15-64	Number of care recipients aged 15-64 years per full-time equivalent (FTE) long-term care (LTC) worker.
Recipient-to-carer ratio 65+	Number of care recipients aged 65 years and over per full-time equivalent (FTE) long-term care (LTC) worker.
Share of personal care workers (% of LTC workers)	Percentage of personal care workers (with professional qualifications as set by the relevant national/subnational authority) among long-term care (LTC) workers.
Pay level of personal care workers (% nurses' wage)	Payment level of personal care workers with professional qualifications as set by the relevant national/subnational authority as a percentage of nurses' wages.
Pay level of other LTC workers (% min W)	Payment level of other LTC workers as a percentage of the minimum wage.

Source: Authors, adapted from the ILO Care Policy Investment Simulator, 2023.

Except for recipient-to-carer ratios among the 65+, none of the other indicators have data on current systems that could be found. The assumptions made to derive a plausible range of ratios and proportion of personal care workers and other LTC workers are based on high-performing countries with available data from different sources as well as previous studies such as ILO (2018a) and Lipszyc et al. (2012). Data on current LTC provision and recipient-to-carer ratios (measured as the number of LTC recipients aged 65+ per LTC worker in FTE) is only available for 16 countries, from the OECD health database (OECD, n.d.). About 11 of these countries showed a ratio of care recipients to LTC workers below 3. Further, see section 5.1 for how disability prevalence by age is estimated as a reference variable into the calculations (a given proportion of which is used as proxy for prevalence of care needs).

Data on personal care workers' wages is also rare and the tool uses a proportion of nurses' wages based on data from Nordic countries, in which personal care workers' wages in Denmark, Norway and Sweden were about 75 per cent of nurses' wages, according to their national statistical database (Denmark, n.d.; Norway, n.d.; Sweden, n.d.). See section 5.1 for data on nurses' wages and imputations.

Appendix Table A.5 shows the policy parameters retained for the ILO scenarios of 2030 and 2035.

5. Fixed policy parameter assumptions

The fixed parameters are the main policy assumptions necessary to complete the information needed by the Simulator, but for which no specific user intervention was deemed necessary, either because of difficulties to estimate a plausible range across countries or because such range was very limited. Some normative judgement was made, such as the decision to keep opening weeks of ECCE provision constant at 52 weeks across countries, even if we know that some countries have systems in place during school term only. This is mainly because parents need wrap-around childcare during school holidays too.

Another overarching assumption, with respect to ECCE and LTC services, is that they are free at the point of use in the sense that the amount of public funds invested in the scheme cover all the costs to run it. This does not mean that the tool imposes a specific private/public model to follow – for example, public subsidies to private providers or a publicly-run system with public employees – neither does the tool need to specify the main organisational level (national or local). It is up to each user to decide based on national social dialogues and consultations with care providers and recipients. However, it is assumed that the investment required would be equivalent in either configuration, provided the parameters are the same. In effect, the tool shows a model based on standards and entitlements, not on operational implementation. However, because of the public model of funding, no provision is set for profit margins in the operation of the services.

Table 5 summarises the main fixed parameters and their justification.

▶ **Table 5. Fixed parameters common to all countries and years for childcare and long-term care**

	Value assumed	Justification
Childcare		
Open days per week	5	Assuming a working week of 5 days
Open weeks per year	52	More generous than just term-time
Staff paid weeks	52	Typical
No. children per facility/community	50	Can be any other number (see De Henau 2022a) – does not affect the calculations
Pay other staff (in % of teacher salary)	50% of AW or min W whichever is greater	Plausible salary of cleaners, cooks etc. (at about the minimum wage, which is around 50% of average wages, the proxy for teachers' wages in many of the countries simulated)
Training staff (per early childhood educator and assistant staff)	0.006	Based on annualised 3-year degree duration with 25 students per lecturer, to renew after 20 years (=3/25/20) [1]
Extra time (non-contact)	0.24	See De Henau (2022a, b) – holiday / sickness / childcare-related leave, other labour and social protections and non-contact time
Full-time hours	40	Roughly average across countries (single figure used for simplicity) – this is also used for LTC
Overhead (non-staff costs such as food, utilities, maintenance, educational equipment) in % of staff costs	33% (50% in 2030 for low and lower-middle income countries)	33% following several studies (see discussion in De Henau (2022a) for all countries in 2035). The 50% assumption in 2030 for lower income countries (group 2) is to reflect different national circumstances (relative to 2035).

	Value assumed	Justification
Long-term care		
Fraction of persons with care needs among persons with disabilities (15-64 years) needing care or support	0.5[2]	Calibrated on Eurostat countries to match the share of 15-64y with severe limitations using EU-SILC (Eurostat, n.d.)

	Value assumed	Justification
Fraction of persons with care needs among persons with disabilities aged 65+ needing care	0.6[3]	Based on middle range of data from Norway and Sweden from OECD health database (OECD, n.d.) and EU-SILC data (Eurostat, n.d.)
FTE care staff for 0-14 years (% of staff of 15-64 years)	25%	Based on ratio of disability among children and disability among adults from WHO (2011)
Visiting nurse (per person 65+ p.a.)	0.0029	3-hour visit twice a year assuming FTE nurse works 40 hours per week (=1/ (40 / 3 x 26))
Training staff (per LTC staff)	0.004	2-year training spread over 20 years (25 students per lecturer) (= 2/20/25) [1]
Overhead (non-staff investments) in % of salary costs	33% (50% in 2030 for low and lower-middle income countries)	Same as ECCE services assumption

Note: (1) 20 years as assumed potential career length in education (just above the 16 years average teacher experience and 2-3 years of other educational experience in some OECD countries (OECD 2021). Career length of personal care workers assumed to be similar. (2) Specific values for Denmark, Sweden, Norway and the Netherlands (higher range based on Sweden, 0.55). (3) Specific values for Denmark, Sweden, Norway and the Netherlands (higher range based on Sweden, 0.65). Source: Authors, based on De Henau 2022a; De Henau 2022b; Eurostat, n.d.; OECD, n.d.; and WHO 2011.

6. Input data

The third element that feeds into each policy's calculations as illustrated in Figure 1 is the input data. All input data is based on secondary sources (using a mix of publicly available online databases and the ILO micro-data repository). However, some imputation was necessary to fill in missing values and/or harmonize different sources for different countries. Moreover, because the Simulator projects the policy scenarios to 2030 and 2035, it was necessary to project some of the data. The reference year for most data is 2019, chosen as the pre-COVID situation (and because at the time of data collection in 2021, this was the most recent year available). The following sections explain how some of the input data were estimated, harmonised and imputed, and how some of them needed to be projected to the relevant scenario year, mainly those entailing populations and monetary amounts.

6.1. Imputation and harmonization of main input data

Average earnings

Average earnings (AW) are the average monthly earnings of employees measured in national currency units. AW is mainly taken from the Global Wage Report (ILO 2020), with checks against the ILOSTAT database (ILO, n.d.-a), the OECD database (OECD, n.d.) and ILO micro-data repository (Appendix Table A.1). Some figures available for years prior to 2019 were then inflated by the GDP deflator (from ILO, n.d.-a) to approximate wages in 2019.

The only exceptions were Mozambique, Senegal, Kenya and South Africa. Neither Mozambique nor Senegal had any data on wages that could be found from the various databases at hand. So, the tool gives them a measure of total labour income (from national accounts calculations, available in ILO, n.d.-a) divided by total employment (also from ILO, n.d.-a). Checking this method using countries in Africa with both data on wages and labour income seemed to yield similar results.

Further:

- for Kenya, data is from the Kenya National Bureau of Statistics (2020) with wages adjusted upwards to 2019 using GDP deflator data (from ILO, n.d.-a);
- for South Africa, the average wage is the weighted average of the minimum wages attributed to workers in informal employment and the average earnings of formal employees, using their respective proportion in total employment as weights.

Minimum wage

Minimum wage is the monthly national minimum wage measured in national currency units.

The estimations for the minimum wage values are mostly based on data from the same Global Wage Report (ILO 2020) with the rule that for countries with missing data or no legislation on minimum wage, the value is set to 45 per cent of average wages as this is the level at which minimum wages often lie, where they exist, in the sample of countries used in the study (De Henau 2022a). The minimum wage is used for workers in the informal economy as it is assumed they would receive a minimum flat-rate benefit for childcare-related leave, assumed to be equivalent to the minimum wage. The proposed paid leave scenarios for workers in the informal economy are based on the ILO Social Security (Minimum Standards) Convention, 1951 (No. 102) (Periodic payment for maternity benefit: at least 45 per cent of the reference wage (Art. 67)). Convention No. 102 refers to extending maternity benefits to "*all women in prescribed classes of economically active population, which classes constitute not less than 20 per cent of all residents*" (Art. 48). The same replacement rate is assumed for parental and paternity leave for men in the informal economy. Note as well that, as this exercise focuses on aggregate costings, the implementation challenges of providing cash transfers to informal workers are not addressed here, but they are nevertheless important to consider when applying these transformative scenarios in practice (ILO 2021a; De Henau 2022a).

A further correction was done for countries whose minimum wage was found below their poverty line, so that the minimum wage for the purposes of the tool was adjusted upwards to the level of the poverty line. These countries are Bangladesh, Ghana, Kyrgyzstan, Mexico and Rwanda.

Poverty line

Data for national poverty line figures is taken from the ILO Social Protection Floors Cost Calculator (ILO, n.d.-b) and Jollife and Prydz (2016), measured in proportion of GDP per capita. Countries with data from both sources were given the average of the two.

There were 9 countries with missing data from both sources, all from upper-middle- to high-income countries (Brunei Darussalam, Cyprus, Hong Kong (China), Japan, Rep. of Korea, Malta, New Zealand, Saudi Arabia, and Singapore). These were given the value of 20 per cent of GDP per capita, in line with other high-income countries.

ECCE and LTC current spending

Data on public spending on ECCE is taken from Eurostat (n.d.) and, if missing, then from OECD (n.d.) and, if missing, then from UNESCO UIS (n.d.), and, if still missing, then the value of 0.05 per cent of GDP is given as the minimum value observed across the non-missing countries. The exception to this sequential data allocation is that the Eurostat spending figure for Iceland, France, the Netherlands, Italy, Finland and Cyprus is superseded by that from OECD (n.d.) as it was more plausible, and the figure for Portugal is taken from UNESCO UIS.

Data on public spending on LTC is readily available from OECD for most OECD countries (OECD, n.d.). For all remaining countries, the share of public spending on LTC in total spending on LTC is imputed from that of OECD countries, at around 90 per cent.

Data on LTC total spending is taken from WHO (n.d.) to which total spending on the social aspect of long-term care is added for countries with available data (using OECD, n.d.). Missing values are deemed 0 in line with similar countries with very low levels of spending. Only New Zealand is given a value of 0.2 per cent of GDP in line with Australia as it was unlikely to have near-zero LTC spending.

Note that for China, India, and Indonesia, LTC spending (total and public) is set to 0.1 per cent of GDP, and to 0.2 per cent for Russia and South Africa, following de la Maisonneuve and Oliveira Martins (2015).

Reference salary of teachers

The reference salary of teachers is given in percentage of GDP per capita. It is used to calculate, for each projected year, the reference salary of early childhood educators in ECCE, based on data of salaries of pre-primary and primary teachers or equivalent.

Such data is only available for some OECD countries, either for pre-primary teachers or for primary teachers (or both), taken from OECD (n.d.). Many countries with data on both have very similar levels of pay for the two categories. Hence, the tool takes the pre-primary teachers' salary, or the primary teachers' salary if the former is missing. For Denmark and Norway, salaries of pre-primary and primary school teachers were taken directly from their national online database rather than the OECD database (Denmark, n.d. and Norway, n.d.). For other upper-middle to high-income countries (including other OECD countries with missing data), the salary is set to 100 per cent of average wages given that in countries with data on teachers' salaries, most are at about the level of average wages.

In low-income and lower-middle income countries, no data was available, so the rule used was to give teachers a salary that is 200 per cent of average wages, in line with evidence from more fine-grained analysis for selected African countries (De Henau 2021). For countries where professional wages (taken from ILO, n.d.-a) were below twice the average wage and the average wage was above twice its GDP per capita, the teacher salary was adjusted downwards to 150 per cent of average wages. Further adjustments were made for some countries, based on more fine-grained data analysis for UN Women carried out for five African countries (De Henau 2021) and a paper by the World Bank on teachers' salaries (Evans et al. 2020), as follows:

- Cote d'Ivoire: salary set to 2.8x GDP per capita using De Henau (2021);
- Senegal: salary set to 2.7x GDP per capita using De Henau (2021) and Evans et al. (2020);
- Tanzania: salary set to 3.5x GDP per capita using De Henau (2021);
- Kenya: salary set to 3.5x GDP per capita using KNBS (2020);
- Uganda: salary set to 2.3x GDP per capita using Evans et al. (2020);
- Nigeria: salary set to 1.1x GDP per capita using De Henau (2021);
- Rwanda: salary set to 1.2x GDP per capita using De Henau (2021);
- Cambodia: salary set to 1.8x GDP per capita using Evans et al. (2020);
- Tunisia and Morocco: salary capped at 3x GDP per capita as implausibly too high;
- South Africa: salary set to 1.6x GDP per capita using De Henau (2021).

Reference salary of nurses

The reference salary of nurses is given in percentage of GDP per capita. It is calculated in two ways:

- for OECD countries, the OECD health database has data on the salary of nurses in percentage of average wages, which is given as the ratio of nurses' wages to average wages, with a minor correction for Belgium (using OECD 2019) and an addition for Denmark (using Denmark, n.d.) and Sweden (using Sweden, n.d.);
- for other countries, the tool assumes that nurses and teachers are paid the same, therefore using the reference salary of teachers estimated above.

Social security contribution rate of employers

Social security contributions (SSC) from employers (in per cent of AW) was taken from data in the Global Revenue Statistics Database available at OECD (n.d.) and in the Taxing Wages database for OECD countries (also OECD, n.d.).

For OECD countries, the average rate of employer's social security contributions (in percentage of average wages) taken from the Taxing Wages comparative tables is averaged across two family types: childless single and two-earner couples with 2 children, all earning 100 per cent of average wages.

For other countries, the global revenue statistics database gives information on revenue from social security contributions of employers in percentage of GDP, which is then divided by the average share of labour income in GDP obtained from ILO (n.d.) to get a proxy for the contribution rate of social security by employers. If this data was missing, further imputation was made using tax revenue data from UNU-WIDER (n.d.) giving information on revenue from social security contributions from both employees and employers (also in percentage of GDP). It is assumed that the contributions by employees and employers are equal, so the revenue is divided by 2 and then divided by the share of labour income in GDP.

Share of informal employment in total employment

The share of informal employment in total employment is mainly used for the calculation of the eligible employees and self-employed to the different leave schemes. Values are taken from data on the proportion of informal employment in total employment given in ILO (2018b), Table B.1. For missing countries, the tool uses the middle of a range obtained from Figure 5 in ILO (2018b), or a plausible proxy country's value as follows:

- Kenya and Ethiopia (range greater than 90 per cent): 90 per cent;
- Kazakhstan (range 20-49 per cent): 30 per cent (near Russia);
- Malaysia (range 50-74 per cent): 65 per cent (near Thailand and Vietnam);
- Philippines (range 50-74 per cent): 70 per cent (near Vietnam and Indonesia);
- Saudi Arabia (range 50-74 per cent): 60 per cent (near Iraq);
- Canada, New Zealand, Australia, Israel (range less than 20 per cent): 15 per cent (between Europe and USA);
- Hong Kong (China), Singapore (range unknown): 30 per cent (near Korea).

Eligible employed population by age and sex (for leave policies)

For the leave entitlement and breastfeeding breaks calculations, the tool needs to distinguish men and women by whether they are in formal or informal employment. For countries with micro-data on informal employment that are consistent with the values in ILO (2018b), further disaggregation of the main 'share of informal employment' is possible by gender and age to estimate more precisely the composition of the three main groups of employed people with respect to paid leave policies (formal employees, formal self-employed and informally employed). Specifically, the share of informally employed among employed, by sex, is determined by subtracting the share of formal employees and formal self-employed from 1 (or the total employed population).

These were obtained from micro-data calculations (in which the share of formal and informal employment might either be taken directly from the micro-data if available or using the overall share of informal employment across different age groups and genders as a uniform proportion).

The eligible population of employed men and women must also be restricted to potential parents, using information on the presence of children in the micro-data. For men, the tool assumes that *existing* fathers in employment aged 25-54 represent the population of *potential* fathers in employment (in that age group), given evidence that the arrival of a child does not alter the employment pattern of men (Kleven at al. 2019). For women, establishing the eligible population requires to consider the potential changes in female labour supply as a result of increased provision of adequate paid leave and childcare, given the evidence that countries with more generous such policies have more continuous maternal employment patterns (see Kleven et al. 2019). Eligible women are taken as those who are employed prior to the birth of their first child, the proportion of whom can be measured by the employment rate of childless women of the same age (25-54).

The Simulator assumes that the proportion of eligible men and women of the younger age group (15-24) is measured by the employment rate of the whole age group by gender, as it is impossible to distinguish between the presence of own children and the presence of younger siblings with the data at hand.

For countries with missing micro-data or missing information on the presence of children in the micro-data (see list and type in Appendix Table A.1), proxies were used. For example, if the presence of children is missing for determining the percentage of employees among employed fathers aged 25-54, the tool uses the proportion of employees among all employed men of the same age. For countries with missing micro-data altogether, aggregate data from ILOSTAT on the proportion of employees among employed men aged 25 or above was used.

Number of births from employed mothers and fathers

Using data from the UN population division (UNDESA 2019) on the number of births by age of the mother (split between age group 15-24 years old and 25-54 years old) are computed by age group and gender.

For mothers, the number of births is weighted by the proportion of mothers in each age group and multiplied by their respective employment rate (as estimated using micro-data and proxies for countries with missing micro-data or information on the presence of children).

For fathers, the number of births from mothers in the same age group is further weighted by the proportion of fathers present, a factor that is constructed from micro-data on the share of children aged 0-1 with two parents. This is then multiplied by the employment rate of fathers of that age group. The regional average was used to impute the proportion of fathers for countries with missing micro-data or missing information on the presence of children in the micro-data.

Disability prevalence by age

The main determinant of care needs for which data was widely available is taken as the prevalence of disability in the adult population, separately for the 15-64y age group and the age group 65y and over. For the latter, the tool uses a proxy measured for the age group 60+: the percentage of life expectancy at age 60 lived with a disability, calculated using data from WHO Global Health Observatory (WHO, n.d.). It is calculated as 1 minus the ratio between healthy life expectancy age at 60 (HALE) and life expectancy at 60 (LE), thereby indicating the proportion of

remaining life lived with less than a healthy state as a proxy for 'disability' or 'impairment' prevalence in the population aged 60 and over.

WHO (n.d.) does not report life expectancy or healthy life expectancy data for the 15-64 years old age group alone. Instead, it contains data on life expectancy at birth and healthy life expectancy at birth, which are used in the same way as for the age group 65 years and above to calculate the disability rate in the entire population. The tool assumes that the proportion of persons with disabilities among the age group 0-59 years old is a reasonable proxy for that of the adult population of working age. This is calculated as the ratio between the number of persons with disabilities aged 0-59 (the difference between total population with disabilities and population aged 60 and above with disabilities, using their respective population size) and the population aged 0-59 in each year.

For more detailed discussion on how to proxy care needs in the population, section 5.1 of De Henau (2022a) explains the assumptions and validity checks taken in these imputations, comparing data for European countries from Eurostat (n.d.) on limitations in activities of daily living from the EU Survey of Income and Living Conditions (EU-SILC) and the European Health Interview Survey (EHIS) and the OECD health database (OECD, n.d.).

Data on HALE is missing for Hong Kong (China), so the value is imputed from the average of the values for Japan, Korea and Singapore.

6.2. Projection of population and monetary input data

The Simulator identifies some year-specific data that need to be projected to the relevant years of the chosen scenario (2030 and 2035), mainly population and monetary data.

The 'growth' factors from the input data are either:

- population growth factors to the year of projection (2030 or 2035), for different age groups relevant to the age group projected (0-1y, 0-4y, 0-14y, 15-64y, 65y+, and total population) – using population projections from UNDESA (2019). The population growth factor to the year chosen by the user is the ratio between the 2020 population and the projected population in the chosen year; or
- GDP growth factors calculated to the year of projection (2030 and 2035). They are calculated by extrapolating from projections carried out by IMF (2021) to 2026, in which an 11-year annualised growth rate from 2015 to 2026 is used each year beyond 2026. Average wages are assumed to grow in line with GDP per capita.

It is further assumed that all the ratios remain constant at their level of 2019, e.g., employment rates, tax rates, share of informal employment, gender wage gap, etc.

7. Calculations

This is the core of the Simulator, where the user-selected policy inputs, fixed parameters and relevant input data are combined to produce the investment requirements and job generation and gender equality results. This section starts with the investment calculations for each policy, then looks at employment effects and concludes with additional results relevant to gender equality impacts, such as changes in gender gap in monthly earnings and labour supply of mothers as a result of the combination of leave and ECCE policies. The latter result is further used to calculate an indication of return on investment in childcare and leave provision, proxied by the dollar increase in maternal earnings (a component of GDP) per dollar invested (or per any national currency unit).

The Simulator estimates the investment requirement for free, universal and publicly funded (public, private or not-for-profit) services. It does so by calculating the investment requirement for all the population within the age range or corresponding requirements, and then subtracts the current public investment if available. Hence, the Simulator does not limit the calculation to estimate the investment requirement for those that are not currently covered. In this way, the investment is guaranteeing a better care service system to be provided to all the people in need of care. Estimating the investment requirement only for those that are not covered would translate into lower investment requirements but would assume that countries could end up with two differentiated systems where some people have a care service system with policy parameters that correspond to international standards and people that were already covered would remain in the same situation.

7.1. Childcare-related leave investment requirements

Investments for paid leave entitlements (maternity, paternity and parental leave) are calculated as those necessary to fill the gaps between the current leave entitlements (provided by national law) and the target chosen by the user in the policy inputs. Calculations are done separately for maternity leave, paternity leave, parental leave (mothers), parental leave (fathers), and for each type of employment (formal employees, formal self-employed, informally employed). This results in 12 gaps to calculate. By construction, the gap for the informally employed is equal to the target, given that the current provision is zero.

Gaps are capped in the sense that if a country has more generous policies (in terms of total duration of paid leave available to each parent) than the target retained, the gap to cover is zero, rather than a negative value. This implies that the tool does not use the 'surplus' weeks provisioned for one group to fund the 'deficit' weeks of another group when investments are aggregated across groups. For example, if the target for employees is 18 weeks of maternity leave and paternity leave, but the country provides 26 weeks for mothers already and 0 weeks for fathers, the tool calculates that the gap to be invested in is 18 weeks for fathers and zero for mothers, not '- 8' for mothers which could be 'redistributed' to fathers. The reason behind the capping is to preserve national specificities as to why these countries offer longer durations, given that the target of leave provision in combination with the start of ECCE services is flexible and follows national priorities, as explained in ILO (2022a) and De Henau (2022a).

For each policy area, the tool checks which projection year has been selected by the user and calculates the results by using the corresponding parameters and projected population or earning input data of the corresponding year (from Tables 6 and 7). Fixed parameters are common to all years and scenarios.

The annual investment for each of the 12 gaps is thus the product of different input data and corresponding year parameters. This is exemplified here for formal employee mothers to calculate maternity leave investment through the following steps:

- calculating the number of eligible mothers aged 25-54 as the product of the number of births from potentially employed mothers (25-54y)[3] and the share of formal employees among women aged 25-54;
- calculating the number of eligible mothers aged 15-24 as the product of the number of births from employed women (15-24 years old) and the share of formal employees among women aged 15-24;

[3] Eligible mothers are those potentially employed, using non-mothers' employment rate as proxy (for age group 25-54 only).

- adding the two together;
- multiplying the number of eligible mothers by:
  - the gap in weeks, and
  - the average earnings (AW) transformed into weekly earnings (= *monthly AW* x 12 / 52).

This is then divided by 1 million to obtain the annual spending requirement in millions of national currency units (NCUm). It is divided by the corresponding GDP for the year projected to obtain spending in percentage of GDP, and NCUm are transformed into the equivalent in millions of US$ using the exchange rate NCU/US$ (ratio of input data GDP NCUm to GDP US$m).

The results also display the 'annual incremental investment' required to reach the annual spending level by the year projected. This is the fraction of GDP that needs to be added to the level of spending of the current year (in this version of the tool it is 2022), *each year* until the projected year of the scenario, in order to reach the goal of the target annual investment calculated above. So, for example if the annual investment to fill the gap in paid leave provision is 1.3 per cent of GDP by 2035, this means that between 2022 and 2035, a 13-year period, the government needs to add an extra 0.1 per cent GDP (= 1.3% / 13) to its annual budget every year, in order to reach its goal of spending 1.3 per cent of GDP by 2035 annually. The year 2022 is chosen as the starting year following ILO (2022a) and De Henau (2022a).

The Simulator also calculates the additional investment per child (the unit cost of the investment to fill the existing gap), which is the total gross additional annual investment in leave divided by the number of births of employed parents, again converted to a proportion of AW. This measure is used in the calculation of return on investment (ROI) of the leave and ECCE policies combined (see section 6.7).

7.2. Breastfeeding breaks investment

Given that only Spain, Croatia and Slovenia offer social insurance-based breaks, the gap in provision that needs investment in all other countries is the figure chosen by the user in the policy inputs in terms of minutes per day (at 100 per cent of average wages for formally employed and at the chosen rate in percentage of the minimum wage for the informally employed).

The method to calculate the annual investment is the same as for leave, replacing the 'gap in weeks' by the gap in minutes for a fixed duration of 6 months assumed and measured in terms of fraction of a typical working week:

Gap in weeks = *selected minutes* / 60 x 26 x 5 / 40.

7.3. Early childhood care and education investment

To calculate the investment need for ECCE provision, the Simulator uses a simplified assumption that all children are looked after in centre-based facilities, in order to consider additional investments (e.g., for catering). However, this does not prevent the implementation of family day care (childminders) in parallel, such as in community settings. The tool assumes a combination of early childhood educators and early childhood assistant educators working together to look after a number of children, the proportion of whom is determined by the user in the policy input variables, as described above.

Overhead investments are assumed to be the same, and a fixed proportion of staff investments, depending on the income level of the country as explained in section 4. Since the purpose of the tool is to give an idea of investment required at the national level, the tool assumes a homogenised structure for children, at about 50 per facility and investment calculations are first made at the facility level then aggregated across the country to derive national investment requirements. The tool assumes a facility size of 50 children in line with De Henau (2022b) using UK data, but the size could be any number without affecting any of the results. However, evidence from Denmark suggests smaller facilities of maximum 50 children offer better outcomes to children than larger (100+) ones (Jensen 2017).

The simulator calculates the total annual investment required to provide services to all children of a certain age in proportion of the selected enrolment rate by age group. This means the tool overrides existing provision with the

new system. It then calculates the additional investment required to top up current public spending in order to provide the new system.

The steps to calculate the annual investment are:

- calculating the proportion of each age group in the facility from the selected enrolment rates in the policy inputs;
- calculating the weekly hours of contact (for ECED children and pre-primary children separately) by multiplying the selected number of opening hours for each group to the number of children in each group in the facility;
- calculating the number of full-time equivalent (FTE) staff in contact with ECED children and pre-primary children, respectively, by converting the weekly contact hours into a number of FTE using the child/staff ratio of each age group (assuming 1 FTE is 40 hours per week), taking account of the fraction of FTE that is non-contact time and time for replacement (leave / sickness / holiday) set at 24 per cent (in the fixed parameters);
- calculating the number of other staff (cooks, cleaners etc.) simply by multiplying the number of children in the facility by the proportion of other staff chosen in the user's policy inputs;
- calculating the number of training staff (to train the early childhood educators), a fixed proportion per staff;
- calculating the average wage for ECED and pre-primary staff (each being the average of the pay rate of assistant early childhood educators and that of early childhood educator staff weighted by their relative share in ECED and pre-primary respectively as selected by the user in the policy inputs);
- calculating the wage of other staff (50 per cent of teacher wage) and training staff (teacher wage);
- calculating the wage cost for each staff category by adding to their wage the social security contribution of employers;
- calculating the total wage costs in the facility by multiplying the number of each type of staff with their wage costs and adding the overheads (non-staff costs);
- aggregating the total investment for the entire country by multiplying the investment per facility by the total number of facilities in the country (given by the number of children enrolled in ECCE divided by 50). These are first calculated in NCUm, then transformed into US$m and then in per cent of GDP;
- total staff in FTE in the country is also calculated by multiplying the number of FTE staff per facility by the number of facilities;
- calculating the additional investment in ECCE services (in percentage of GDP) by subtracting the projected current public spending of the corresponding year (based on input data as described in section 5.1) and converting it to NCUm and US$m values. This means that the investment calculations entail not only expansion of coverage but also quality improvement for existing services: pay rates, child/staff ratios and working conditions chosen by the user are simulated to apply to the entire service provision, new and existing;
- calculating the incremental additional investment in the same way as above (see section 6.1 on paid leave);
- a unit 'additional' investment per child per age group is then calculated by multiplying the share of additional investment in total investment and the unit investment per child per age group of the total investment (in percentage of average wages). This is used, alongside the unit additional investment of leave, to calculate the ROI of ECCE and leave policies (see section 6.7).

Note that if the user selects policy inputs that entail total investments below current spending, the tool sets the additional investment to zero (rather than to a negative value), to signify that no further investment is required.

Simulated results for ECCE investments can be compared with current public spending on primary and secondary education, using data from UNESCO UIS (n.d.) for 2019.

7.4. Long-term care investment

As in the case of ECCE services, the tool assumes a simplified model of provision, based on community-based care in recipients' homes, for which annual investment requirements are mostly a function of care needs and the number of care workers per recipient and their wages.

Using the policy inputs about level of pay, proportion of personal carers among caring staff and the recipient-to carer ratios for each age group, the calculations of annual investment in LTC follow a similar pattern as for ECCE described in section 6.3 these imply:

- calculating, for each of the 15-64 and 65+ age groups, the density of LTC workers per 100 population in each age group by applying the assumed fraction of persons with disabilities needing care (taken from the fixed parameters table) to the country-specific data on disability prevalence and dividing it by the user-selected recipient-to-carer ratio. For children aged 0-14, the tool assumes the density to be a quarter of that for the 15-64 age group (see section 4);
- calculating the total number of LTC workers (in FTE) for each population group by multiplying their respective density by the population of that age group;
- calculating the number of visiting nurses by multiplying the fixed parameter of their density per 65y+ population to the population of that age group;
- calculating the number of training staff by multiplying its density taken from the fixed parameters (per LTC staff) to the number of LTC workers;
- calculating the weighted wage of LTC workers, as the average of the wage of personal care workers (set to 75 per cent of nurses' wages) and that of other LTC workers (in percentage of minimum wages), weighted by the user-selected proportion of personal care workers in the system;
- adding social security contributions of employers to calculate the wage cost of each group;
- calculating the total wage costs by multiplying the average wage cost of each staff group by its total number;
- adding the overheads to calculate total investments in NCUm, then convert to US$m and per cent GDP;
- calculating the additional annual investment by subtracting the current LTC spending from the input data (projected to relevant year) in per cent of GDP then converted to US$ and NCUm;
- calculating the incremental investment in the same way as above (see section 6.1 on paid leave).

Note that if the user selects policy inputs that entail investments below current spending, the tool sets the additional investment to zero (rather than to a negative value), to signify that no further investment is required. In the ILO scenario for 2030 and 2035, two countries have simulated investment below current spending, hence their additional investment appears as zero in the results (Norway and the Netherlands). Norway's system is well calibrated as the discrepancy between the simulated investment using current policy parameters from the data and its actual current spending is only 4 per cent of the current spending. The discrepancy for the Netherlands is higher (30 per cent), partly owing to a much larger share of residential LTC provision (Eurofound 2020), which pushes up total current spending compared to the simulated care spending that is calibrated on community-based care. Unfortunately, because of the lack of more detailed spending data by type of care (residential versus community-based), the tool could not adjust for this discrepancy for the Netherlands.

Simulated results for LTC investments can be compared with current public spending on health, using data from WHO (n.d.) for 2019.

7.5. Employment effects

This section examines how the Simulator calculates the employment generated from the investment in the care policy packages. The tool calculates the direct employment effects from the policy investment calculations (staffing of each system) and the indirect and induced employment effects using input-output methods described below. Indirect effects are the employment creation in the industries supplying the care sector and in their own supplying industries. Induced effects are the employment creation resulting from the spending in the economy of part of the increased earnings of households stemming from the direct and indirect employment generation.

The sub-sections below explain in more detail how each element of the employment creation is calculated in the tool. Note that direct employment is deemed 'generated' in the year of the scenario, since the investment consists in hiring more care workers and/or increasing their pay. Input-output methods used to derive the indirect and induced employment creation do not settle on a given time period following the investment, but it is generally understood to be in the short-term (one or two years). Given that the investment is annual, the employment creation is permanent.

The bulk of the methods used to calculate the potential increase in labour demand (employment creation) is explained in De Henau (2022a).

Direct employment (net of current employment)

The gross direct employment is calculated in the policy investments described above (total ECCE staff in country, and total LTC staff in country), assumed to be generated in the year of the investment. It is gross in the sense that it includes current employment, given that the reform system overhauls the current system.

It is assumed that the proportion of women in each type of care service is given by:

- for ECCE: data on the proportion of women among pre-primary teachers (with regional average imputed for missing countries) (source: UNESCO UIS, n.d.);
- for LTC: data on the proportion of women among nurses (with regional average imputed for missing values) (source: WHO, n.d.).

This enables the calculations of total female employees (and by deduction, male employees) in ECCE and LTC.

Once these are obtained, the net direct employment creation in care (LTC and ECCE) by gender is calculated by subtracting the estimated current employment in ECCE and LTC using sectoral employment data. Sectoral employment is obtained using the ISIC Rev. 4 classification at division (2-digit) level, distinguishing different industries. In particular, divisions:

- 85: Education;
- 86: Human health activities;
- 87: Residential care activities;
- 88: Social work activities without accommodation.

Industries 87 and 88 contain the bulk of care employment.

Detailed data on sectoral employment for 62 countries is available from ILOSTAT (ILO, n.d.-a) and from national databases for New Zealand and Australia (New Zealand, n.d., and ABS, n.d., respectively). This means for these 64 countries it is possible to calculate the employment by gender for industries 86, 87 and 88 separately. From this the share of industries 87-88 in employment from industries 86-87-88 is calculated for each sex and overall. These proportions are used to calculate the regional average, which can be imputed to the other countries for which employment data was only available at ISIC Rev. 4 1-digit level of industry disaggregation (that is combining industries 86-87-88 into one single industry of 'health and social work'). Regional proportions have been applied to the following missing countries and territories:

- Singapore, China, Malaysia, Hong Kong (China), Argentina, Chile, Kenya, Morocco, Nigeria, Senegal, Tunisia, South Africa.

For the other missing countries, closer geographical or socio-economic proxy countries have been used:

- The Russian Federation, Kazakhstan and Saudi Arabia were given the proportions of Kyrgyzstan;
- Canada was given the average proportions of USA/UK;
- The Republic of Korea and Japan were given the average proportion of Europe and Central Asia (given the larger care systems in these two countries and thus larger employment, compared to the average for Asia and the Pacific).

Finally, the employment obtained for the industry divisions 87-88 is further adjusted to take account of the fact that not all of the employment in these industries is ECCE or LTC as some of it is social work or other forms (for example, drug rehabilitation). The detailed breakdown of the different types of social work is found for the UK using 4-digit industrial disaggregation of data from the Annual Survey of Hours and Earnings, which shows that 66 per cent of women and 50 per cent of men employed in industries 87 and 88 are actually working in childcare or long-term care (ONS, n.d.). The Simulator uses the UK figures as proxy for all the other countries except the Nordic countries and the Netherlands. To this employment, the number of pre-primary teachers is added, as it is classified in the education industry 85. This is true except for Nordic countries where pre-primary teachers are included in industry 88 as part of integrated preschool childcare systems and so do not need adding (Denmark, n.d.; Norway, n.d.; Sweden, n.d.).

Note that for Denmark, Sweden, Iceland and Norway, the proportions of employment 87-88 that is in 'care' is based on Danish data and is 75 per cent for women and (also) 50 per cent for men (Denmark, n.d.). For the Netherlands, the employment in care was calculated directly from specific sources (Fukkink 2017 and Eurofound 2020).

This gives the estimated current employment in 'care' (namely, LTC + ECCE) for all, for women and for men respectively.

The next step is to estimate the proportion of that employment that is in ECCE versus LTC in order to estimate the net employment creation in each sector since different multipliers are applied to each sectoral direct employment.

The gross (post-reform) employment in each sector is given by the policy investment calculations (staff in ECCE versus staff in LTC). This yields the proportion of ECCE staff in total care staff (ECCE + LTC).

It is the current employment in each sector that is more difficult to ascertain given that both LTC and ECCE employment are found in industry 88. A simple imputation method is to take the proportion of ECCE spending on total LTC+ECCE spending to get a plausible breakdown of ECCE and LTC employment. The proportion of current ECCE employment in total care employment is calibrated between 20 and 80 per cent of the total care employment (with a maximum of 60 per cent for upper-middle- and high- income countries), given the unlikely absence of ECCE employment and the absence of data on LTC spending in some countries.

Note that for Australia and New Zealand, which spend far more on childcare than on LTC according to official data, this method would yield implausible estimates of employment in each sub-sector (in the sense that current employment in childcare would be larger than total employment after the simulated investment). The tool corrects for this by taking a proportion of childcare workers in the total of childcare workers and 'aged care' workers (LTC workers) from national statistics (ABS, n.d.; New Zealand, n.d.). For New Zealand, using the industry sub-division employment data of its 2018 Census gives an estimate of 33 per cent of childcare workers in total care employment. This is because the data shows that residential care and non-residential care have equal employment and it is assumed that childcare within non-residential care is half its employment, the rest being community-based care workers, for lack of more disaggregated data. Similar corrections are applied to Norway, Denmark and the Netherlands, using national data sources or specific sources as above that give a better indication of the employment shares of ECCE and LTC (Denmark, n.d.; Norway, n.d.; Fukkink 2017, and Eurofound 2020).

The proportion of ECCE in net new care jobs is thus calculated from the share of ECCE in current care jobs and its share in gross total care jobs. This yields the net new jobs in ECCE by gender (the proportion of ECCE in total care jobs is assumed to be the same for men and women). The remainder of the care employment creation is the net new LTC jobs.

Indirect and induced employment creation

The tool calculates the indirect and induced effects based on the multipliers (Type I and Type II respectively) applied to the net direct employment creation (by gender) for each policy. Type I multiplier is the ratio between direct + indirect jobs and direct jobs. Type II multiplier is the ratio between direct + indirect + induced jobs and direct jobs. Indirect employment is generated through the supply chain of the industry invested in. Induced employment is generated by the increased consumption from the direct and indirect employment creation (higher earnings that translate in part into higher consumption expenditure, the rest being savings and taxes).

Given the lack of data on the industry ISIC Rev. 4 divisions 87 and 88 specifically (residential care activities and social work activities without accommodation), the employment multipliers of the proxy industry of Education (ISIC Rev. 4 division 85) are used for ECCE and those of Health and social work (ISIC Rev. 4 divisions 86-87-88 combined) for LTC.

Given the larger labour intensity of social work compared to healthcare (De Henau and Himmelweit 2021), the Type I multiplier for LTC is adjusted by taking the simple arithmetic average of the Type I multipliers of the two proxy industries (Education and Health and social work).

Type II multipliers of both sectors are adjusted using the method developed by De Henau and Himmelweit (2021) to account for wage differentials (depending on the wages selected by the user for each policy), calculated respectively for all employed and for employees.

Therefore, for each sector (ECCE or LTC), the net indirect jobs (both sexes) are simply the respective Type I multiplier minus 1 applied to (namely, multiplied by) the net direct jobs. Then the number of indirect jobs going to women is the percentage of women in indirect jobs from each policy applied to the total indirect jobs (the proportion of women is calculated directly from the input-output analysis and sectoral employment by gender obtained from micro-data or ILOSTAT), and the number going to men is simply the difference from the total.

For induced jobs, the adjusted Type II multiplier minus the Type I multiplier is applied to (namely, multiplied by) the net direct jobs, which yields the net induced jobs by gender using the same method as for indirect jobs to find the proportion of women and men. Induced employment increase is shown for indicative purposes as it constitutes an upper bound of the potential job creation, notoriously difficult to establish as the consumption 'reaction' of households from a shock in their earnings can take time and will vary by income levels through different propensities to consume. It will also be influenced by any tax changes that might be implemented necessary to fund the investment, likely reducing its overall impact. However, only looking at direct and indirect employment creation would constitute a lower-bound of total job creation as it is unlikely that households would not increase expenditure at all in the economy (see discussion in Ilkkaraçan and Kim 2019).

Calculations are also made to obtain the indirect and induced jobs that are formal, based on the proportion of formal jobs in each industry where the indirect and induced jobs are created. If detailed industry-level data is lacking for formal employment, the overall share of formal employment across all industries is applied to the total indirect jobs and total induced jobs created.

Finally, the employment created by the leave policy (overall and formal) is simply the induced employment created by an increase in household consumption, given that part of the earnings generated from the paid leave (and job protection) is expected to be spent in the wider economy (using the Type II employment effect per cent of GDP invested in the household 'sector', derived from the input-output analysis). It is assumed the increased consumption is generated by the protection and continuation of maternal employment and earnings (even if the replacement rate of the leave policy is less than 100 per cent of their wages) against a counterfactual of quitting employment altogether. This assumption uses the findings by Kleven et al. (2019) that mothers retain more of their working hours and earnings patterns after the birth of their first child in countries with more adequate childcare policies such as Denmark and Sweden, compared to Germany, Austria, the United Kingdom of Great Britain and Northern Ireland and the United States.

7.6. Earnings effects (for gender wage gap)

Another set of 'benefits' from the care and leave investment policies is the change in earnings as a result of a combination of labour supply and labour demand effects, which may affect the gender wage gap.

Supply-side effects

As explained above in the leave section, one of the expected effects of the leave and ECCE policies is enabling mothers to keep their employment pattern and progress in their career and earnings prospects, much like women without children and men (Kleven et al. 2019). So, on the one hand, if mothers are able to maintain their pre-birth employment pattern (job and earnings), this will push up the average wage of women and thus reduce the gender

wage gap overall. This is a labour supply effect. In countries where female employment is low even among non-mothers, the investment may also help gradually change social norms and improve the employment prospects of women overall as some childless women may have selected out of (full-time) employment after marriage or in anticipation of future pregnancy (ILO 2018a).

The tool uses the theoretical/maximum increase in female earnings aged 25-54 to derive the new earnings of all women. This is the ratio between:

- the new female earnings averaged across all employee mothers (calculated by assuming mothers aged 25-54 take up similar average earnings as non-mothers aged 30-39 at their peak salary period, but mothers aged 15-24 and 55 and over do not see any change); and
- the current average earnings of all female employees.

This was obtained from micro-data analysis by comparing the average earnings of non-mothers and mothers in that age group.

As mentioned before, not all countries have data that distinguish the presence of children in the micro-data (and some countries do not have micro-data available at all or no wage data). 30 countries with missing values received an imputed figure (regional average). See list in Appendix Table A.1.

Note that Saudi Arabia is given the regional average of Asia and the Pacific. Also, two countries had earnings of mothers above those of non-mothers (Tunisia and Laos) so these kept earnings intact (which meant no increase in female earnings from that labour supply effect).

The tool also considers the possibility for the user to select less than full-time arrangements for either leave or ECCE policies, with the logical implication that the 'regain' in maternal earnings may not be full. For example, if the user selects a policy input of weekly opening hours for ECED and/or pre-primary services that are below 40, the resulting system would potentially lead mothers to work part-time or not at all if part-time jobs cannot be found. As the effects of such part-time arrangements are difficult to estimate, the tool assumes a straightforward proportional impact during the time childcare is available.

The same goes for leave periods that do not fully close the childcare gap, so that the earnings effect reflects this break. The combination of both, taking into account the different durations of leave and ECCE, is a moderating factor to apply to the potential wage increase (and is 1 if full-time and no gap, and less than 1 if not). Applying this factor to the potential increase in female earnings and multiplying it by the current female earnings yields the annual new earnings for women. The annual earnings for men are unchanged. Note that earnings are converted in proportion of AW, starting with existing earnings of men and women, given by the ratio of average male and female earnings to average earnings.

For example, in Switzerland, micro-data (EU-SILC) show that:

- the ratio of average female earnings to average earnings is 0.74;
- the maximum increase in earnings for women aged 25-54 is 1.16, which is calculated as the ratio between the peak earnings of non-mothers aged 30-39 and average earnings of all women aged 25-54;
- the share of women aged 25-54 in total female employment is 62 per cent.

So, the increase in female earnings from a supply-side perspective would be 9.9 per cent (=16% x 62% + 0 x 38%), which, applied to the current average female earnings of 0.74 (74 per cent of average wages), means a new average earnings figure for all women of 0.81 (81 per cent of average wages). If the policy inputs chosen entail less than full-time coverage for children – for example part-time opening hours and only half the paid leave period necessary to close the childcare gap – the increase would only be half of 9.9 per cent.

Besides the mothers' wage increase, the tool also needs the increase in maternal employment rate (aged 25-54), which is taken as the difference between the employment rate of non-mothers and that of mothers aged 25-54, measured in the micro-data, and imputed for countries with missing micro-data as explained in the leave section (section 3). This increase is also weighted by the factor adjusting for non-full time leave or ECCE provision.

Demand-side effects

The previous section described the potential effects of the childcare and leave policies on the supply-side of the labour market, that is what women are willing to offer and take as employment. On the other, hiring, side (the demand-side), the investment in care services creates direct and indirect employment as described in section (6.5) above. Assuming that the jobs created in each industry and occupation are taken up by men and women in proportion of their share in each industry and occupation, this increase in employment (mostly in the care industry but also in the supplying industries) will change the composition of both male and female earnings in the economy overall, and thus the overall gender wage gap. The tool estimates the combined impact of both demand and supply effects.

Note that the supply-side effects are estimated as a result of investment in paid leaves and ECCE services, in order to close the 'childcare gap' in law and practice, whereas the demand-side effects are estimated as a result of investment in both ECCE services and LTC services. Investment in LTC services may yield supply-side effects too in the sense that in the absence of such investment, some people may have to take time off work (reduced hours or quitting employment) to look after relatives in need of long-term care. These unpaid carers would therefore benefit from LTC services to relieve them with long hours of unpaid care, but these effects could not easily be estimated for the purpose of this tool and are thus left out. As such effects are likely to entail further increases in female employment (given women are the majority of unpaid care providers of working-age, as shown in ILO 2018a), so the effects measured by the Simulator are likely to be underestimates of the supply-side effects.

The new jobs created in care on the demand-side are given wages calculated in each of the care policy investments (sections 6.3 and 6.4). That is the average wage determined by the composition of staff and their respective wages, which are either pre-set or determined by the user. This enables both the ECCE and LTC new wage bills by gender to be calculated.

The next step is to calculate the current care wage bill in ECCE and LTC by using a proxy for average wages in the care sector given by:

- the compensation of employees (namely, wage bill paid by the employer inclusive of employer social security contributions) per FTE employee in the industries 87-88 (measured in percentage of average compensation of employees) obtained from Eurostat input-output data, which is not available by gender (Eurostat, n.d.);
- the average earnings of all personal and social service workers (also in percentage of average wages), which is also available by gender. These variables are taken from ILOSTAT data on earnings by occupation and gender (ILO, n.d.-a). Missing values are imputed using regional averages (with the exceptions of Saudi Arabia, which is given the regional value of Asia and the Pacific for all sexes (0.79) given the low gender wage gap in that country)[4], and South Africa, which is given the lower American regional average for women of 0.58 (compared to 0.69 or Africa) to reflect more unequal earnings in that country.

For EU countries with non-missing data for the compensation of employees per FTE employee in the industries 87-88, the gendered wage in care is given by multiplying it by the ratio between the wages of male and female employees in care.

This gives an estimate of the average wage in care for each gender from which the tool calculates the total current care wage bill by multiplying the average wage by the current care employment estimated in the previous section (section 6.5).

Combining both effects

The wage bill by gender in all other current (namely, non-care) sectors is given by the new wages for women multiplied by the non-care employment of women and the current (unchanged) male wage multiplied by the non-care employment of men. The tool applies the new wages for women overall as this is the expectation of the supply-side effect (calculated in the supply-side effects section).

[4] ILO (2021b) reports a gender wage gap of 10.2% for all employees in Saudi Arabia (Saudi and non-Saudi nationals).

The remaining wages necessary to calculate the new wage by gender is the indirect (and induced) wages created by the investment. This requires measuring the employee-only indirect job creation using the same method as described in section 6.5 but applying the *employee* multipliers instead of the *employment* multipliers. Then the average wage for men and women (with new wages for women) is applied to those jobs. This yields the indirect jobs' wage bill by gender (and induced jobs' wage bill if Type II multipliers are used as well).

Therefore, the new wage bill for all employees by gender is given by the sum of:

- the new care wage bill (that is the wage bill of the new care systems that has absorbed the old care system);
- the new non-care wage bill of current employment (with increased female earnings);
- the indirect and/or induced wage bill from the care investment.

This gives the new wage bill by gender, with or without induced effects. Dividing this bill (with or without induced effects) by the post-reform employee population (with or without induced effects) yields the new average earnings by gender from which it is possible to derive the new gender gap in monthly earnings, again with or without induced effects.

As a reminder, gender gap in monthly earnings = (1 – *female wages* / *male wages*) x 100.

Note that the current and new gender gaps in monthly earnings are raw in the sense that they are not adjusted for differences between men and women in the composition of their labour force characteristics such as age, education and occupational concentration. Therefore, these wage gaps are not comparable to the more recently calculated adjusted wage gap compiled by the ILO in the Global Wage report 2018/19. This methodology provides a series of gender wage gaps in monthly or hourly earnings, using both the median and the mean, which do not result in as large a discrepancy as the raw mean and median gaps in some countries (see ILO 2018c for details). Lack of detailed and accurate micro-data for most countries prevented the tool from calculating adjusted gaps. It would also have required to calculate the changes in qualifications of those taking up the new jobs if shuffled within the existing labour market, using probability-ranking matching methods, which the tool is not built towards.

In the ILO scenario for 2035, there are around 12 countries where the investment in the care package results in a negative gender wage gap. A negative gender wage gap means that the average earnings of women are higher than the average earnings of men. This is entirely due to the large increase in female employment in care jobs (direct effect) with wages above average. This is the case of countries where the labour force participation of women was low to start with (and sometimes also men's), and with the simulation, many women become employed with jobs paid better than the jobs that other women or men hold, meaning their average earnings increases above that of men.

Note that it is also possible for the gender wage gap to *increase* if the user chooses parameters that involve higher care investment with large employment creation (mainly for women given their share in care employment), but at wages that are below average. This will push down female earnings overall compared to men and, if not compensated enough by a supply-side increase in maternal wages, can result in higher wage gaps.

7.7. Return on investment (for childcare-related leave and ECCE)

This section introduces another type of simulated benefits, aiming to get a sense of the cumulative benefits from mothers regaining their pre-birth earnings over their lifetime, thanks to the combined effects of leave and ECCE policies that close the childcare policy gap. It builds on a simulation method developed in De Henau (2022b), itself following the empirical findings of Kleven et al. (2018; 2019).

These benefits can be compared to the total investment, per mother, for the government to provide paid childcare-related leave and childcare services to her children. If the economic benefits in terms of lifetime earnings regained offset the total investments of childcare and leave payments, the policy is deemed to have a benefit-to-cost ratio superior to 1, within an agreed horizon.

The benefit-to-cost ratio is a measure of return on investment (ROI) with the return measured in terms of increased earnings in the economy. The employment income is one of the main two components of GDP (the other being corporations' profits), the ROI can be seen as the dollar increase in GDP per dollar invested in ECCE and leave.[5]

The horizon over which to count the benefits could be the remaining working life of a typical mother after the birth of her first child. For simplicity across all countries, the tool assumes this is 35 years (namely, the age at first birth around 30 if retirement age is about 65). The age at first birth is below 30 in most countries of the world (it is highest in OECD countries whose average is an age of 29). Only Korea, Spain, Greece, Luxembourg, Japan, Ireland and Switzerland had a mean age at first birth above 30 (by just one or two years) according to the OECD family database (OECD, n.d.) circa 2020. This means that apart from those few countries, the assumption of 35 years is a conservative estimate of the period over which earnings benefits could be calculated, because the remaining years of working life of a typical mother would be longer (such as in low-income countries where the age of the mother during first birth is younger).

Therefore, on the investment side, the Simulator calculates the total additional investments (in percentage of average wages) of providing ECCE and childcare-related leave to the children of a mother aged 25-54. In a typical configuration, this would be the unit additional investment (in percentage of average wages) per child of one year of leave, of two years of ECED and of the remaining years until primary school entry as pre-primary education.

The actual number of children of mothers aged 25-54 is taken from the input data. This was calculated using micro-data and imputed for missing countries and territories as follows:

- Hong Kong (China), Japan, Singapore and Kazakhstan: from Russia and Korea;
- Canada and New Zealand: from Western Europe, Australia and USA;
- Malaysia and Indonesia: from the Philippines;
- Saudi Arabia and Israel: from Egypt.

The tool estimates the ROI that would be achieved when considering a plausible gain for mothers' lifetime earnings, based on high-performing countries. The literature has shown that countries with more generous childcare policies are associated with a smaller child-induced penalty in mothers' overall earnings when compared to fathers' (and to mothers' earnings prior to their first birth), at about 21 per cent in Denmark and 26 per cent in Sweden (Kleven et al. 2019). Such penalty is higher in countries with more pronounced childcare policy gaps, such as the UK, Austria and Germany, at 44 per cent, 51 per cent and 61 per cent respectively (Kleven et al. 2019). Overall earnings here are understood as the earnings of all mothers and fathers (employed and not employed), which can be proxied by multiplying average earnings of mothers and fathers in employment by their respective employment rate. For simplicity, self-employed are treated as employees and given average earnings of employees of their respective age and sex.

The tool calculates the ROI by considering the increase in earnings of mothers to reach about 80 per cent of fathers' earnings, as expected from the Danish study in Kleven et al. (2018). The ROI is the ratio between:

- the difference between 80 per cent of the employment-weighted earnings of fathers aged 25-54 (in percentage of average wages) and the current employment-weighted earnings of mothers aged 25-54 (in percentage of average wages), which is then multiplied by the number of years of the lifetime horizon considered (35 years); and
- the product between the number of actual children per mother and the additional unit investment of the total policy package.

For example, in Switzerland, mothers' weighted average earnings are about 34 per cent of fathers' (among the 25-54y age group), owing to lower employment rates than fathers (56 per cent employment-to-population ratio for mothers compared with 81 per cent for fathers), higher part-time prevalence and lower hourly wages, translating into lower monthly earnings (69 per cent of average wages for employee mothers compared with 138 per cent of average wages for employee fathers). If mothers' earnings reached 80 per cent of fathers', then, on average, for every US$ spent on providing the additional resources to cover the 6 years of leave and ECCE for each of 1.6 children

[5] Or any currency as the ROI has no unit (it is the ratio of two monetary quantities measured in the same currency unit).

on average by 2035 (ILO scenario), the economy would see an increase in earnings (GDP) by US$5.35, so the ROI is 5.35. Again, the increase in earnings from 34 per cent to 80 per cent of fathers' is a combination of increased employment rates, increased working hours and increased hourly wages.

This calculation is done for countries with micro-data that have both information on the presence of children and earnings. Unfortunately, about thirty countries do not have both sets of information (see appendix Table A.1 for the list). The tool uses imputed information from other sources or for men and women in general, rather than just parents (see section 6.6 for how average male and female earnings were calculated). Given the likely larger discrepancy between mothers' and fathers' earnings than women's and men's, using the latter to compute ROI would yield more conservative values. However, as long as these are superior to 1, then the policy can be seen as producing benefits that outweigh the costs.

Finally, as the user could potentially choose policy inputs that translate in policies that do not close the childcare policy gap completely, the tool moderates the difference between the target of 80 per cent of fathers' earnings and current mothers earnings by the fraction of FTE employment rate of mothers expected as a result of the policy choices (e.g., if childcare is offered part-time, the assumed increase in earnings will be less than 100 per cent of the full increase).

Note that the target of 80 per cent is set to 90 per cent for Thailand, Vietnam, and Lao PDR to reflect higher current wages of mothers in proportion of fathers (above 80 per cent).

Note that instead of the ROI estimate for a target of 80 per cent of fathers' earnings, the user could also calculate (separately from the tool results) the actual figure of the proportion of fathers' earnings required to reach a ROI > 1 in the 35-year period considered, which enables the user to evaluate whether the target of 80 per cent is plausible (most countries require increases well below that). The answer is the ratio between:

- the sum of
  - the employment-weighted earnings of mothers);
  - the additional investment of leave and childcare multiplied by the number of children and divided by 35; and
- the employment-weighted earnings of fathers.

Finally, a more technical comment about ROI calculations in general: benefits and investment spending are typically measured in present value using different discount rates for each to account for different time horizons (e.g., childcare occurs over the earlier period, say the first 6 years of a mother's children's life, while regained earnings are over the remainder of the mother's working life). However, given the nature of the investment and empirical evidence, the bulk of the regained employment and earnings is likely to occur over the same period as the investments are incurred, which means the discount rates can be very similar, which is what the tool assumes.

7.8. Tax and net investment effects

As explained in De Henau (2022a), the increase in employment and earnings will bring in tax revenue that will partly offset the gross investment funding requirements. More precisely, tax revenue from the increase in employment and earnings (and substitution from unpaid to paid care work) is estimated using existing ratios of tax-to-GDP taken from the UNU-WIDER Government Revenue Dataset (Prichard, Cobham, and Goodall 2014; McNabb 2017). The data taken from the Government Revenue Dataset was from the 2020 iteration of the database (showing data for 2017–19).

The total tax and social security contributions revenue in percentage of GDP has been applied to the Type I and Type II GDP multipliers calculated using the same input–output and social accounting matrix (SAM) tables as for employment. This gives an estimate for the short-term (annual) fiscal revenue per fraction of GDP invested in care (for example, given as a per cent return).

The total tax return on investment in ISIC Rev. 4 division 85 (education) and divisions 86, 87, and 88 (health and social work) is given in percent return to proxy the effects for ECCE and LTC investments respectively, measured either for Type I effects (excluding induced effects) or Type II effects (including induced effects).

These proportions enable to calculate net investments as the difference to 100 of these proportions multiplied by the gross investment, yielding the net additional annual investment in ECCE and LTC (in millions of national currency units, millions of US$ and percentage of GDP).

The net investment represents the fiscal effort that would need to be funded through other resources (additional taxes, borrowing or rebalancing of government spending).

8. Information on results

This section provides a few pointers to results that may appear as outliers in the ILO scenarios.

Note that results are best interpreted with plausible user-selected inputs aimed at improving current systems. Although the user can select policy inputs below the current provision (e.g., enrolment rate below current data), the Simulator is not calibrated to estimate reduction in spending with related negative employment effects (e.g., austerity policies). The tool will show additional investment at zero if the simulated total spending is below the current spending. In that configuration, employment effects will also be shown as zero. If both investments in childcare and leave policies are non-existent then the ROI will not be calculated either (and produce a "n/a" result) as the investment denominator is zero.

It should also be noted that some countries will have impacts that are beyond usual expectations as exemplified in previous sections. A few examples below.

Gender equality in employment and wages

If the investment increases employment and earnings of women more than that of men this creates a negative gender wage gap, because the average earnings of women overall become greater than men's after the investment. About 12 countries have negative gender wage gaps as a result of the care investments in the 2035 ILO scenario. One way to converge towards more equality overall would be for more men to join these better-than-average paid care jobs.

Return on investment

In the same vein, the ROI can be very high because of a high numerator induced by the tool's assumption that mothers' employment-weighted earnings are to reach 80 per cent of fathers' weighted earnings, even if the additional spending on childcare or leave is quite low, because the system is already well developed and therefore the employment effect on mothers' earnings are expected to be low too. This is the case for Iceland, a country that already has a comprehensive leave and childcare system, but whose data show that employment-weighted mothers' earnings is at 50 per cent of fathers' (compared to 67 per cent in Slovenia, another country with relatively well-developed full-time childcare). Therefore, a jump of earnings to 80 per cent will increase income by a lot relative to the small total additional investment required in either year (which is only 28 per cent of average wage per child, compared to Slovenia's 149 per cent of average wage per child). Indeed, in the 2035 ILO scenario, Iceland has a ROI of 26 because of that assumption (compared to 1.9 for Slovenia). It only needed mothers' earnings to reach 51 per cent of fathers' earnings to get a ROI>1 given the low additional investment required (6 times lower for leave and ECCE than Slovenia).

There are about 13 countries (including Switzerland and Iceland discussed above) with ROI >5 in the 2035 ILO scenario, mostly as a result of the large motherhood employment penalty that is reduced drastically by the investment (many in central and eastern Europe), at an additional investment that is reasonable in percentage of GDP.

By contrast, 6 countries have a ROI figure below 1 in the 2035 ILO scenario, owing to a large number of children that increase the total childcare investments (Senegal, Mozambique), and/or to an already high level of mothers' earnings in percentage of fathers' (Singapore, Brunei Darussalam, Lao PDR, Tanzania). It should be noted that in some of these countries, the smaller increase in income also stems from the use of imputed wages from all men and women rather than from fathers and mothers (as explained in section 6.7 above).

In general, countries with lower ROI (even if above 1) tend to be those with a greater proportion of young children in their population (mostly lower income countries) as this will significantly push up the investment for leave and childcare (see De Henau 2022a, for more details). Indeed, two of the main determinants of high childcare investment in proportion of a country's GDP are likely to be a higher share of young children in the population and a higher average wage for early childhood educators, which by construction is set to about twice the average wage in many lower-income countries.

Investment requirements

Investments between countries of a similar income group and socio-demographic profile as well as within geographical proximity could also differ from one another because of an institutional difference, such as a different minimum wage in percentage of their respective average earnings. In terms of ECCE investment, the minimum wage determines the wage level of early childhood assistant educators, a substantial proportion of ECCE workforce in lower income countries by construction in the ILO scenarios. For example, Pakistan has a minimum wage estimated at 84 per cent of average wages, compared to India's 31 per cent. Both have similar proportions of young children in the population around 10 per cent, simulated teachers' wages of about 215 per cent of GDP per capita, and current spending on childcare (around 0.05 per cent of GDP). Yet, because of this discrepancy in minimum wage levels, the additional spending required in the ILO scenario for 2030 is much higher in Pakistan (3.5 per cent of GDP) than in India (2.2 per cent).

▶ Appendix

A.1 List of countries and datasets

▶ **Table A.1. List of household and labour force micro-surveys and input–output data**

Country/Territory	Country code (iso3code)	Micro-data	Input–output data
Argentina	ARG	Encuesta Permanente de Hogares (EPH) 2019	OECD
Australia	AUS	Household, Income and Labour Dynamics in Australia (HILDA) 2015	OECD
Austria	AUT	EU-SILC	OECD
Bangladesh	BGD	Labour Force and Child Labour Survey 2017	ADB
Belgium	BEL	EU-SILC	OECD
Brazil	BRA	Pesquisa Nacional por Amostra de Domicílios Continua (PNAD) 2019	OECD
Brunei Darussalam	BRN	Labour Force Survey (LFS) 2019 [$]	OECD
Bulgaria	BGR	EU-SILC	OECD
Cambodia	KHM	Labour Force Survey (LFS) 2019	OECD
Canada	CAN	Labour Force Survey (LFS) 2019	OECD
Chile	CHL	Encuesta Nacional de Empleo (ENOE) 2019 [$]	OECD
China	CHN	Chinese Household Income Project (CHIP) 2013	OECD
Colombia	COL	Gran Encuesta Integrada de Hogares (GEIH) 2019	OECD
Costa Rica	CRI	Encuesta Continua de Empleo (ECE) 2019 [$]	OECD
Côte d'Ivoire	CIV	Enquête Nationale sur la Situation de l'Emploi et le Secteur Informel (ENSESI) 2019	SAM 2013
Croatia	HRV	EU-SILC	OECD
Cyprus	CYP	EU-SILC [$]	OECD
Czechia	CZE	EU-SILC	OECD
Denmark	DNK	EU-SILC [$]	OECD
Egypt	EGY	Labour Force Survey (LFS) 2016	SAM 2011
Estonia	EST	EU-SILC	OECD
Ethiopia	ETH	National Labour Force Survey 2013	SAM 2015
Fiji	FJI	Employment and Unemployment Survey (EUS) 2016	ADB
Finland	FIN	EU-SILC [$]	OECD
France	FRA	EU-SILC	OECD
Germany	DEU	EU-SILC [$]	OECD
Ghana	GHA	Ghana Living Standards Survey 2017	SAM 2013
Greece	GRC	EU-SILC	OECD
Hong Kong, China	HKG	General Household Survey (GHS) 2019*	OECD
Hungary	HUN	EU-SILC	OECD
Iceland	ISL	EU-SILC	OECD
India	IND	Population and Labour Force Survey (PLFS) 2018 [$]	OECD

Country/Territory	Country code (iso3code)	Micro-data	Input–output data
Indonesia	IDN	Labour Force Survey (SAKERNAS) 2019*	OECD
Ireland	IRL	EU-SILC	OECD
Israel	ISR	Labour Force Survey (LFS) 2017*	OECD
Italy	ITA	EU-SILC	OECD
Japan	JPN	Labour Force Survey (LFS) 2019*	OECD
Kazakhstan	KAZ	**	OECD
Kenya	KEN	HBS 2016	SAM 2014
Kyrgyzstan	KGZ	Child Labor Survey Results 2014 $	ADB
Lao People's Democratic Republic	LAO	Labour Force Survey (LFS) 2017	ADB
Latvia	LVA	EU-SILC	OECD
Lithuania	LTU	EU-SILC	OECD
Luxembourg	LUX	EU-SILC	OECD
Malaysia	MYS	Labour Force Survey (LFS) 2018*	OECD
Malta	MLT	EU-SILC $	OECD
Mexico	ME	Encuesta Nacional de Ocupación y Empleo (ENOE) 2019	OECD
Mongolia	MNG	Labour Force Survey (LFS) 2019	ADB
Morocco	MAR	Enquête Nationale sur la Consommation et les Dépenses des Ménages (ENCDM) 2014 $	OECD
Mozambique	MOZ	Inquérito sobre Orcamento Familiar (IOF) 2015 $	SAM 2015
Nepal	NPL	Labour Force Survey (LFS) 2017	ADB
Netherlands	NLD	EU-SILC $	OECD
New Zealand	NZL	**	OECD
Nigeria	NGA	General Household Survey (GHS) 2019	SAM 2006
Norway	NOR	EU-SILC $	OECD
Pakistan	PAK	Labour Force Survey (LFS) 2018	ADB
Peru	PER	Encuesta Permanente de Empleo (EPE) 2019 $	OECD
Philippines	PHL	Labour Force Survey (LFS) 2019	OECD
Poland	POL	EU-SILC	OECD
Portugal	PRT	EU-SILC	OECD
Republic of Korea	KOR	Local Area Labour Force Survey 2014	OECD
Romania	ROU	EU-SILC	OECD
Russian Federation	RUS	Russia Longitudinal Monitoring Survey (RLMS) 2014 $	OECD
Rwanda	RWA	Labour Force Survey (LFS) 2018 $	SAM 2011
Saudi Arabia	SAU	**	OECD
Senegal	SEN	Enquête Nationale sur l'Emploi (ENE) 2016 $	SAM 2014
Singapore	SGP	**	OECD
Slovakia	SVK	EU-SILC $	OECD
Slovenia	SVN	EU-SILC	OECD
South Africa	ZAF	Quarterly Labour Force Survey (LFS) 2019 $	OECD
Spain	ESP	EU-SILC	OECD

Country/Territory	Country code (iso3code)	Micro-data	Input–output data
Sri Lanka	LKA	Labour Force Survey (LFS) 2018	ADB
Sweden	SWE	EU-SILC	OECD
Switzerland	CHE	EU-SILC	OECD
Tanzania, United Republic of	TZA	Integrated Labour Force Survey (ILFS) 2014 $	SAM 2013
Thailand	THA	Labour Force Survey (LFS) 2019	OECD
Tunisia	TUN	Tunisia Labour Market Panel Survey (TLMPS) 2014	OECD
Turkey	TUR	Labour Force Survey (LFS) 2013	OECD
Uganda	UGA	Labour Force Survey (LFS) 2017	SAM 2013
United Kingdom	GBR	EU-SILC	OECD
United States	USA	Current Population Survey (CPS) 2019	OECD
Viet Nam	VNM	Labour Force Survey (LFS) 2014	OECD

Note: ** Countries with no micro-data. * Countries with no presence of children identifiable in micro-data. $ Countries with no earnings micro-data. OECD STAN input–output data are for 2015 and ADB data for 2017. EU-SILC data is for 2016 (2015 for Ireland, Iceland and Switzerland; 2014 for Malta; 2012 for Germany). Sources of SAM data: Mainar Causapé et al. (2017) for Kenya; Boulanger et al. (2017) for Senegal; Mengistu et al. (2019) for Ethiopia; IFPRI (2017b) for the United Republic of Tanzania; IFPRI (2017a) for Uganda; IFPRI (2014) for Rwanda; Ghana Statistical Services, ISSER, and IFPRI (2017) for Ghana; IFPRI and CAPMAS (2016) for Egypt; Manson, Diao, and Vida (2010) for Nigeria; van Seventer et al. (2019) for South Africa; and Cruz et al. (2015) for Mozambique. Source: Authors' illustrations.

A.2 ILO scenarios parameters

This appendix provides some more detail about the assumptions and policy inputs retained for the ILO scenarios, sourced from De Henau (2022a) and ILO (2022).[6]

Childcare-related paid leave (maternity, paternity and parental leave)

The gaps that need filling in each country reflect existing provisions calculated in section 3. Maternity leave policy scenarios for ILO (2022a) are based on the minimum requirements of the most up-to-date ILO standards on maternity leave, as detailed in Convention No. 183 and Recommendation No. 191. Paternity leave policy scenarios are inspired by the principles of Recommendations Nos. 165 and 191 as well as the 2021 International Labour Conference Resolution concerning the second recurrent discussion on social protection (social security). In addition to the latter, parental leave policy scenarios are also inspired by the principles of Conventions Nos. 102 and 183 and Recommendations Nos. 165, 191, 202 and 204. These scenarios are related to national care policy gaps that countries will progressively fill by extending paid care leave provision at the household level, with gender equality considerations (namely, progressively equalizing childcare-related leave entitlements and promoting an equal sharing of unpaid care work between women and me).

Table A.2 below shows how these different scenarios for maternity, paternity and the resulting parental leave are combined for different countries. The principle behind these scenarios is that each country improves its offer to reach the next target up. By 2035, the scenario achieved by each country in 2030 is then moved up further to the next one, leaving only two groups: the two cells in the bottom two rows and the last column of Table 2 (green cells).

[6] The scenarios are illustrative, and these parameters do not reflect endorsement by ILO tripartite constituents. See De Henau (2022a) for more discussion.

▶ Table A.2. Paid childcare leave scenarios for 2030 and 2035

		Maternity leave	
		Target 1. 14 weeks at 67% AW if below that. →	**Target 2. 18 weeks at 100% AW if above previous**
Paternity leave	**Target 1. 3 days at 100% AW if no paternity leave** ↓	Parental leave covering up to 50% of remaining childcare gap (which is up to 18.7 weeks at 67% AW), split equally between each parent so that parental leave is up to 9.4 weeks each at 67% AW.	Parental leave covering up to 100% of the remaining childcare gap (which is up to 33 weeks at 67% AW or 22 weeks at 100% AW), split equally between parents, so up to 16 weeks each at 67% AW.
	Target 2. Region-specific best-performing (1–3 weeks at 100% AW), if above previous ↓	Parental leave covering up to 50% of remaining childcare gap (which is up to 18.7 weeks at 67% AW), split equally between each parent so that parental leave is up to 9.4 weeks each at 67% AW.	Parental leave covering 80% to 100% of the remaining childcare gap (which is up to 33 weeks at 67% AW or 22 weeks at 100% AW), split equally between parents, so up to 11 weeks each at 100% AW.
	Target 3. 18 weeks at 100% AW if above previous	This combination does not exist.	Parental leave covering 100% of the remaining childcare gap, (which is 16 weeks at 67% AW, or 10.7 weeks at 100% AW), split equally between parents so 8 weeks each at 67% AW.

Note: (1) For 2030, countries can target the scenarios found in either the blue or green cells; while for 2035, only the green cells of the table are possible targets. Note that these scenarios are illustrative and do not reflect endorsement by tripartite constituents. (2) The different targets take into account total provision by gender and type of employment. For example, Canada offers 4.7 maternity leave weeks at 100 per cent AW and 35 weeks of parental leave to mothers at 31 per cent AW, adding up to 15.5 paid weeks at 100 per cent AW equivalent; therefore, since this total is greater than 14 weeks at 67 per cent AW, the target in 2030 is 18 weeks at 100 per cent AW (second column). (3) The childcare policy gap is calculated over one year before ECCE services (but in practice this could be less) and assumes that maternity leave and paternity leave do not overlap. The length of parental leave required to cover the remaining gap is measured at 67 per cent AW. (4) For countries in maternity leave target 1, the 18.7 weeks constituting half of the childcare gap are calculated as 52 weeks minus 14 weeks of maternity leave at 67 per cent AW and 0.6 weeks (or regional best provision) of paternity leave at 100 per cent AW, then divided by 2. (5) For countries in maternity leave target 2, the whole childcare gap of maximum 33 weeks is calculated as 52 weeks minus 18 weeks minus paternity leave (which varies by region). (6) The parental leave in 2030 is capped at 2035 level and the parental leave for self-employed is capped at that of employees. (7) Switzerland is the only country in high-income Europe for whom employee mothers get less than 14 weeks at 67 per cent but instead of increasing to 14 weeks the tool sets the target to 18 weeks at 100 per cent AW as early as 2030. (8) Targets for 2035 can only be found in the bottom two rows and last column of the table. (9) In 2030, maternity leave for workers in informal employment is 14 weeks at minimum wage and paternity leave is 3 days (0.6 weeks) at minimum wage. Paternity leave is increased to 14 weeks at minimum wage by 2035. No paid parental leave is added. (10) Paternity and maternity leave for formal workers in Spain is equalized, as per legal requirements, meaning the rule of Table A.2 is overridden for self-employed fathers (they receive 14 weeks at 67 per cent AW rather than the regional best). (11) As South Africa is the regional best for Africa, its paternity leave is increased to 14 weeks at 67 per cent AW in 2030. (12) Israel and Malta do not currently offer any paid leave to fathers, but because they are high-income countries in Europe, the tool gives them 2.7 weeks at 100 per cent AW as early as 2030 (the regional best provision of Central Asia that is in Bulgaria), rather than just 3 days. (13) It is important to note that these scenarios were established for the sake of calculating budgetary requirements of the investments. It is expected that each country will opt for the favoured combination of leave for each parent and the start of universal childcare, as discussed in section 3, according to national social dialogues. It is important to consider the balance between children's needs, parents' preferences and needs as well as risks to parents' careers and gender equality, including providing strong incentives for fathers' involvement in care provision. Although the leave period extends to about one year (combined) in the 2035 scenarios of this illustrative package of policies, in practice the leave period could be shorter: for example, both parents may take significant portions of the leave together (such as the 18 weeks of maternity and paternity leave, so the partner can help the mother recover and equally share childcare over the initial period of intensive care for new-born children and exclusive breastfeeding where possible). Or the mother could return to work after, say, 6 months, with either the child accessing ECCE services or the partner subsequently taking up months of parental leave, or a combination of both, on a part-time basis. The scenarios here thus present an upper-bound in terms of investments, with significant overlap expected with childcare provision. Source: Authors, adapted from De Henau 2022a.

Early childhood care and education (ECCE) services

▶ **Table A.3. Main parameters of the simulated ECCE model for ILO scenarios**

Parameter	ECED	Pre-primary
Age group enrolment target	• 60% of 0–2-year-olds (high- and upper-middle-income countries by 2030). • 50% of 0–2-year-olds (low- and lower-middle-income countries by 2030) and 60% by 2035.	• 100% of age group from 3 years till entry to primary school (high- and upper-middle-income countries by 2030). • 90% for low- and lower-middle-income countries by 2030 and 100% by 2035.
Child/staff ratio (maximum)	• 4 (high- and upper-middle-income). • 5 (low- and lower-middle-income).	• 8 (high- and upper-middle-income). • 15 (low- and lower-middle-income).
% early childhood educators	• 67% in upper-middle/high income countries (and lower- income by 2035). • 40% in low- and lower-middle income countries in 2030.	• 92% in upper-middle/high-income countries (and lower-income by 2035). • 75% in low- and lower-middle-income countries in 2030.
Opening hours (supervision time)	40 hours per week, 52 weeks per year.	
Wages	• High- and upper-middle-income group: Pre-primary teacher or primary teacher wage (or average wage if missing) for 82% of childcare staff, and 120% minimum wage for 18% of staff (weighted averages across the two age groups). • Low- and lower-middle-income group: twice the average wage or equivalent to teacher wage for 63% of childcare staff, and 120% minimum wage for 37% of staff (in 2030). Same qualification mix as for higher-income countries in 2035. • All wages are then augmented by the country-specific rate of social security contributions of employers to obtain the total wage cost per employee.	
Additional time	• 10% for covering holiday/sickness/care leave. • 14% for covering non-supervision time.	
Other staff	• 2 FTE members of 'other' staff per 50 children (for catering, admin, maintenance). • 0.006 FTE per early childhood educator and assistant for training.	
Overheads	• High- and upper-middle: 33% of staff costs. • Low- and lower-middle: 50% of staff costs (33% in 2035).	
Number of children per facility	• 50 (divided by age group according to share of age group in ECCE target population).	
Non-modelled costings	• Construction costs (facilities), although indirectly included in overheads (mortgage repayment/rent). • Compulsory education costs (to fill gaps in attainment levels when training new ECCE workers).	

Note: Facilities are assumed to have 50 children, but this can be modulated according to the type of provision. (For example, in community settings or childminders' homes, it can be assumed that for every 50 children across different homes, two members of 'other' staff are counted to help childcare staff). The scenarios are illustrative, and these parameters do not reflect endorsement by ILO tripartite constituents. See De Henau (2022a) for more discussion. Source: Authors' illustration.

Long-term care (LTC) services

▶ **Table A.4. Main parameters of the simulated LTC model for ILO scenarios**

Parameter	Ages 0–14	Ages 15–64	Ages 65+
Population with care needs	A quarter of the proportion found for the 15–64 age group.	50% of the proportion of persons with disabilities 15–64-year-olds as measured by HALE data.	60% of the proportion of persons with disabilities aged 65+ as measured by HALE data.
Recipient-to-carer ratio (FTE)	• 2.5:1 (higher-income group); • 4:1 (lower-income group).	• 2.5:1 (higher-income group); • 4:1 (lower-income group).	• 2.5: 1 (higher-income group); • 3:1 (lower-income group).
Wages	• High- and upper-middle-income group: 75% of nurses' wages (or AW if missing) in both 2030 and 2035. • Low- and lower-middle-income group (2030): 75% of nurses' wages for 33% of care workers, and 120% of minimum wage for 67% of care workers. • In 2035, 67% of care workers are at 75% of nurses' wages (and 33% at 120% of minimum wage).		
Other staff	• 3-hour nurse visit twice a year to all 65+ population. • 0.004 FTE per ECCE staff for training.		
Overheads	• High and upper-middle: 33% of staff costs. • Low and lower-middle: 50% of staff costs (33% in 2035).		
Non-modelled costings	• Construction costs (of residential facilities and adapted housing). • Compulsory education costs (to fill gaps in attainment levels when training new LTC workers).		

Note: the scenarios are illustrative, and these parameters do not reflect endorsement by ILO tripartite constituents. See De Henau (2022a) for more discussion. Source: Authors' illustration.

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