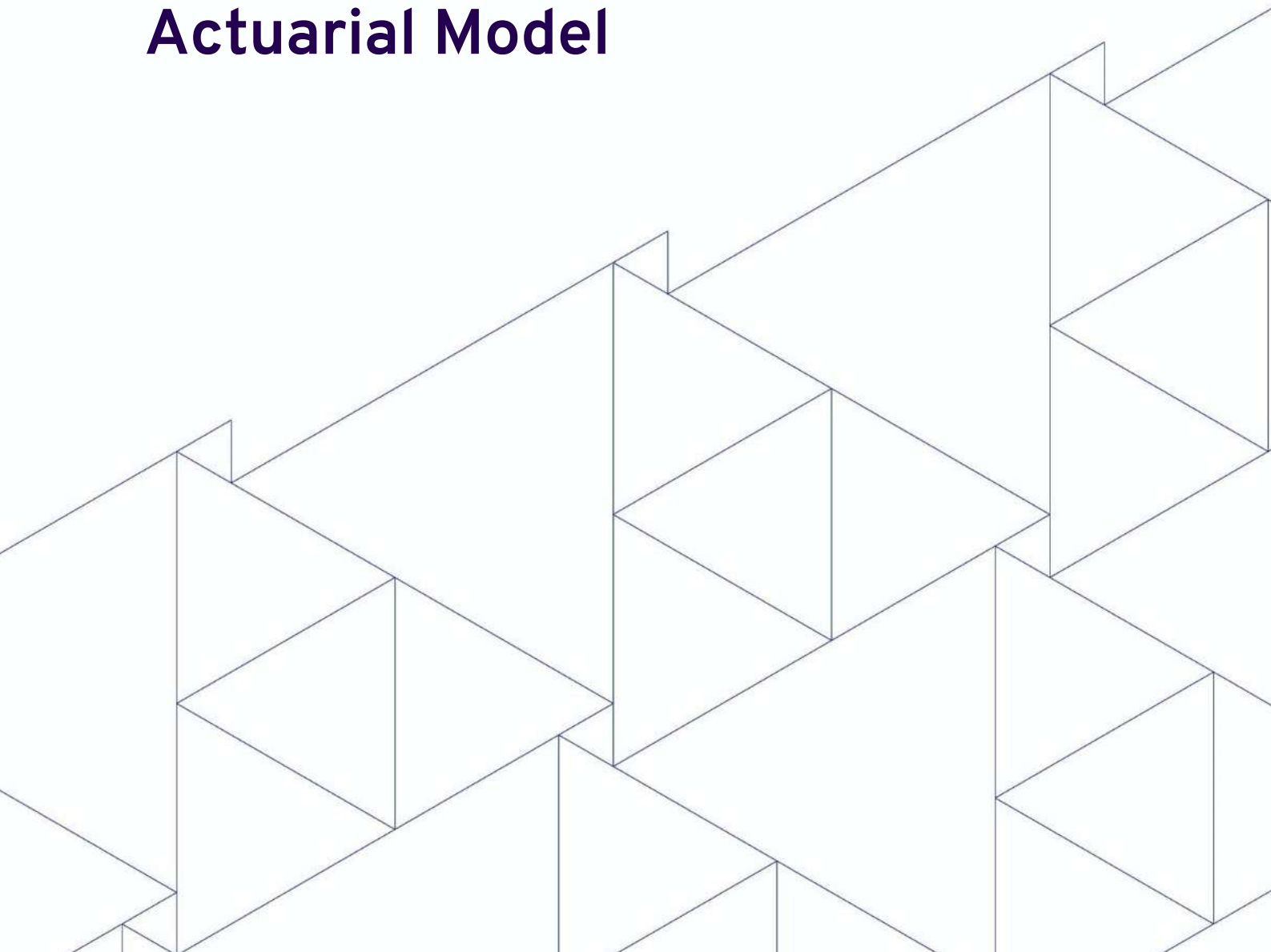
International Labour Organization

ILO/HEALTH
Actuarial Health Model

User Manual

ILO/HEALTH

Actuarial Model



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Preface

The ILO Actuarial Health Model (ILO/HEALTH) is an online, computer-based projection and simulation tool developed by the Social Protection Department of the International Labour Office (ILO). The model aims to provide information on the expected financial impact of the introduction of and/or parametric changes to social protection schemes for medical care, sickness and maternity. The model's main aim is to support the costing and design of reforms in social protection systems.

This technical guide explains the methodology and process flow of ILO/HEALTH and serves as a reference manual for users. ILO/HEALTH is part of a series of quantitative tools developed by the Social Protection Department to support evidence-based policy reforms. The related technical guides and models can be made available to experts in ILO constituent countries as part of ongoing technical support and capacity-building activities in quantitative techniques in social security. Users of ILO/HEALTH are expected to be qualified quantitative experts who have substantial experience in the design and costing of health and social protection systems. The ILO/HEALTH model and technical manual can also be used as a teaching aid for specific training in social security quantitative techniques.

The ILO/HEALTH model and this manual are in line with international actuarial standards and practices, particularly the ILO Social Security Minimum Standards Convention, 1952 (No. 102), the ILO Medical Care and Sickness Benefits Convention, 1969 (No. 130), the ILO Maternity Protection Convention, 2000 (No.183), the ISSA-ILO *Guidelines on Actuarial Work for Social Security*, 2016, and the *International Standards of Actuarial Practice* (ISAP) recommended by the International Actuarial Association (IAA). The main components of the technical specifications of ILO/HEALTH were developed following guidelines of *Social Health Insurance: A Guidebook for Planning* (Norman and Weber 2009), a joint publication of the ILO, WHO and GTZ that provides detailed planning advice for the design of social health insurance systems. It also draws on the extensive knowledge produced by the ILO throughout several decades of policy advice and analytical work on social health protection, in particular its flagship publications such as *Modelling in Health Care Finance: A Compendium of Quantitative Techniques for Health Care Financing* (Cichon et al. 1999), *Financing Social Protection: Quantitative Methods in Social Protection Series* (Cichon et al. 2004), and *Actuarial Practice in Social Security* (Plamondon et al. 2002).

ILO quantitative tools are subject to constant development and improvement. New versions of this manual will be published at regular intervals to reflect major technical advances. Requests for further information and user feedback are welcome and can be communicated to us at socpro@ilo.org.

Geneva, April 2021

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How to use this manual: Getting started

This manual was created primarily to guide actuaries and health economists working on quantitative aspects of social health protection systems in the use of the ILO Actuarial Health Model (ILO/HEALTH). However, the guide includes an introduction to the different policy applications of the tool, which is accessible to all users, and of particular interest to planners and policymakers involved in the management and development of health, sickness and maternity benefits. Users should feel free to jump between sections to find the parts relevant to them.

- Section 0 provides an **overview of the model** and its place in the process of actuarial valuation.
- Section 1 discusses the model's **usefulness in policymaking** and the ISSA-ILO *Guidelines on Actuarial Work* that support the **rationale behind it**.
- Section 2 explores the **actuarial valuation process** in depth.
- Section 3 presents the **basic assumptions** regarding the model's architectural framework, its **key functions**, administration and **outputs** (reports and indicators).
- Section 4 provides comprehensive **definitions of key concepts** used in the model and how they are applied.
- Section 5 offers tips on how to **explore the model** and start planning the model.
- Section 6 provides a **practice exercise** to become familiar with the model and its functions, and to learn tricks and techniques to manipulate information within the model.
- Section 7 offers insights into how to conduct a **consistency review** to ensure the accuracy and applicability of the model using projected results from this model.

If users are new to actuarial valuations and/or social health protection systems or would like a more comprehensive discussion of the concepts and definitions behind the model, we recommend reading through the entire manual, taking the time to understand all the definitions and concepts presented in Sections 2-4 before moving on to Sections 5-8.

Even if users have extensive experience with actuarial models or are fluent in the concepts of actuarial planning for social health protection systems, they are still advised to read through sections 2-5 to grasp the specifics of this model before using it. Users can then set up the model in section 6, work through some examples in section 7, and review the consistency of the results in section 8. (Tip: Users should take time with this – it may differ from other tools they are familiar with.)

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Introduction

Objective of the ILO/HEALTH model

Building on decades of policy and analytical work to support countries in the extension of their social protection systems, the ILO has created a set of quantitative tools to support the long-term planning and sustainability of social health protection schemes and programmes. ILO/HEALTH was created to support the development of institutional capacities to produce a strong evidence-based process of policy reform. The tool should be used as part of a policy process aimed at ensuring that the human rights to access healthcare as well as income security during sickness and maternity become a reality for all. As the world works to achieve the 2030 Agenda for Sustainable Development, there is an urgent need to ensure that the targets of the Sustainable Development Goals (SDG) will be met and sustained over time. To this end, ILO/HEALTH strives to support those efforts, especially with a view to achieving and sustaining over time SDG Target 1.3 on universal social protection and Target 3.8 on universal health coverage.

Scope of the ILO/HEALTH model

ILO/HEALTH can be used to estimate and project the future financial impact of the introduction of and/or parametric changes to social protection schemes and programmes covering the following life contingencies:

- **Healthcare or medical care**, including maternity care: schemes or programmes to provide effective access to healthcare services without hardship. International standards[1] envisage the provision of medical care and maternity care – both preventative and curative – by defining a basic set of goods and services that should be provided with a view to maintaining, restoring or improving health and the ability to work and attend to personal needs.
- **Sickness and maternity:** schemes or programmes to ensure income security during periods of sickness or maternity. ILO instruments prescribe minimum levels of periodic payments to compensate for the loss of earnings during sickness and maternity. To be adequate, income security in the case of maternity should be provided for the period of time necessary to guarantee the health of the mother and the child.

In line with ILO standards and principles, ILO/HEALTH is adapted to the variety of systems that exist to finance these schemes and programmes. The model is adapted to both tax-financed programmes and schemes funded by contributions, in accordance with the recognition by ILO standards that

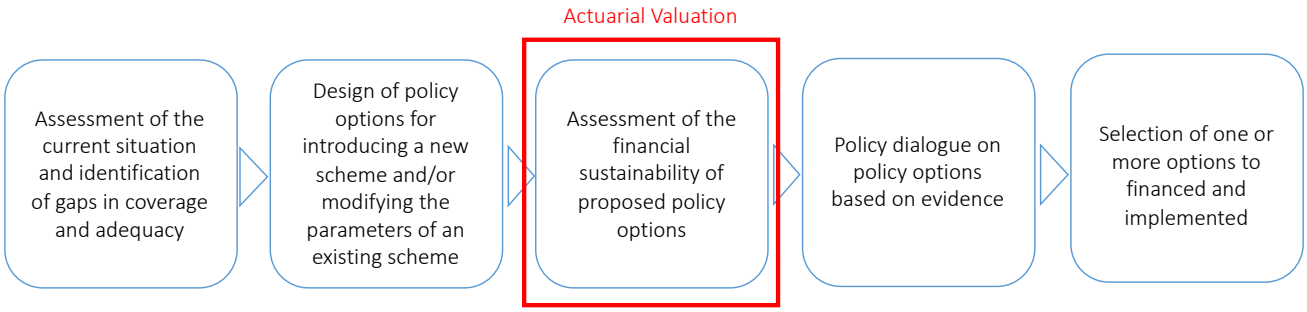
1 Social Security (Minimum Standards) Convention, 1952 (No.102), Medical Care and Sickness Benefits Convention, 1969 (No. 130) and Maternity Protection Convention, 2000 (No. 183).

several approaches exist to ensure effective access to healthcare as long as they respect key principles.[2]

- The model is adapted to the diversity of arrangements that can exist for the financing, purchasing and provision of healthcare. The recourse to social health insurance, a national health service or a combination of these schemes is possible in line with ILO Medical Care Recommendation No. 69, 1944.[3]
- The model can be used for both contributory and non-contributory short-term cash benefits to guarantee income security during sickness and/or maternity.

The ILO strategy for the extension of the human right to social security foresees two dimensions to be pursued by policy reforms: 1) the coverage of more people until universal coverage is achieved, and 2) the progressive provision of higher levels of benefits (i.e., a wider range of services provided, lower or no co-payments to be covered by the patient, higher cash benefits and / or benefits for longer periods of time). Both dimensions have financial impacts that need to be anticipated by the institutions managing and providing health and maternity protection benefits. Each national context is different and follows its own path towards the extension of coverage depending on national circumstances. Figure 1 provides a schematic overview to demonstrate where the actuarial valuation fits within the overall policy reform process.

Figure 1 – Schematic overview of the policy process of extending social protection benefits



The manual and the ILO Actuarial Health Model are anchored in the core principles of the ILO's social security standards adopted by representatives of the world's governments, employers and workers. These standards are a guarantee for balanced, stable and sustainable approaches to scheme design and are universally applicable to the wide variety of healthcare financing systems. These principles include the responsibility of governments to ensure the due provision of benefits and the proper administration of healthcare schemes as part of comprehensive national social protection systems. Governments do so by ensuring that the necessary actuarial studies and

2 ILO. 2020. Towards Universal Health Coverage: Social Health Protection Principles. Social Protection Spotlight Brief. Available at: https://www.ilo.org/secsoc/information-resources/publications-and-tools/Brochures/WCMS_740724/lang--en/index.htm

3 "Medical care should be provided either through a social insurance medical care service with supplementary provision by way of social assistance to meet the requirements of needy persons not yet covered by social insurance, or through a public medical care service." (ILO Recommendation No. 69, para. 5).

calculations concerning financial equilibrium are made periodically and, in any event, prior to any change in either the scope of benefits (healthcare services and interventions, level of co-payment if any, level of cash benefit if applicable) or the level of contributions, taxes or both allocated to covering the contingency in question.

This manual and the ILO/HEALTH model can be applied in a wide range of situations. They include cases at the national or sectoral levels where policymakers may want to introduce a new healthcare, sickness or maternity scheme, or to reform existing schemes, whether they are financed by social insurance, taxes or a combination of both.

ILO/HEALTH is the result of conceptual, methodological and technical development over several decades of experience of the ILO worldwide. It is an actuarial model that combines components of economic, demographic and financial modelling specific to healthcare schemes. Because of its versatility, the model can be used to support quantitative work in both social health insurance schemes and national healthcare services.

The formulation of quantitative models for healthcare schemes comprises a complex and interrelated set of elements. These include the macroeconomic framework, labour market, the different population groups covered, the rules of financing and access to healthcare services, supply and demand for healthcare services, rules for the allocation of financial resources to healthcare service providers and their linkage to payment methods, and the institutional arrangements for linking the flow of economic resources to the demand for healthcare services.

Users of the ILO/HEALTH model

This manual is designed for use by actuaries and health economists working on quantitative aspects of social health protection systems. It is particularly focussed on guiding qualified actuaries in the use of the ILO/HEALTH model to carry out their analyses. However, the guide also includes an introduction to the different policy applications of the tool, which is accessible to all users, and of particular interest to planners and policymakers involved in the management and development of health, sickness and maternity benefits.

The manual aims to accompany users throughout the process of assessment and quantitative modelling of policies and policy scenarios for healthcare schemes and reforms, under the quantitative methodological framework provided by the ILO Actuarial Health Model (ILO/HEALTH). The manual attempts to integrate the conceptual aspects of healthcare systems and healthcare scheme design with the specific modelling process and methodology followed by ILO/HEALTH.

This manual is designed to guide the process of quantitative modelling in a simple, direct way. Each section combines conceptual design aspects with practical aspects of the modelling methodology and the actuarial model tool. Users of the manual will learn how to choose and implement components of the initial configuration and parameterization of ILO/HEALTH, such as the selection of the projection period, whether to work with a single healthcare scheme or to simultaneously define different healthcare and/or sickness and maternity schemes according to country-specific circumstances. As different schemes normally operate with different legal conditions and

institutional and financing arrangements, a multi-scheme model configuration is needed. Other examples include selecting the specific groups of contributors (where applicable) and their dependants (rural/urban, private/public sector employees, etc.) that will interact in a specific model formulation, as well as identifying and specifying the healthcare, sickness and maternity benefits to be included in the model.

Once a model has been specified and parameterized in ILO/HEALTH, this manual guides users through data entry, initial runs, reviewing and calibrating results for a baseline projection scenario, formulating projection scenarios linked to the policy scenarios to be simulated, conducting analyses and reporting results.

ILO/HEALTH provides a wide range of options for reporting and displaying results, allowing users to easily follow both intermediate and final quantitative outputs. This feature is beneficial during the calibration and consistency review process. ILO/HEALTH also provides basic output tables and graphing options for most of the intermediate calculations performed, as well as reports that include an extensive set of demographic and financial indicators, and output tables with the consolidated demographic and financial flows.

The intellectual property rights of all ILO actuarial models belong to the ILO's Social Protection Department (SOCPRO). The ILO is not responsible for projection results produced with the help of its software by users who are not ILO experts (staff or non-staff). Requests for further information or software updates should be sent to PFACTS at the email address given below.

This user manual was developed by Andrés Acuña-Ulate and Sergio Velasco, Social Security Actuaries of the Public Finance, Actuarial and Statistics Unit, PFACTS, and Fabio Durán-Valverde, Head of the Unit, with assistance from Nanya Sudhir and Zhiming Yu, Technical Officers of the Unit. It has received extensive contributions from Lou Tessier, Health Protection Specialist of the Social Protection Department of the ILO. It also received contributions from André Picard, Head of the Actuarial Services Unit of the Social Protection Department of the ILO, and from members of the International Social Security Association (ISSA) Technical Commission on Statistical, Actuarial and Financial Studies. The manual also benefited from reviews by the following ILO specialists of the Social Protection Department: Kroum Markov, Legal Officer; Maya Stern-Plaza, Legal Officer; Karuna Pal, Head of the Programming, Partnerships and Knowledge-Sharing Unit; and José Francisco Ortiz, ILO Social Protection Specialist. This manual was prepared under the technical supervision of Fabio Durán-Valverde.

Comments and contributions to improving the user manual are welcome and can be sent to socpropfacts@ilo.org.

1. The ILO intervention model for actuarial work: Building a strong technical base for a policy-oriented process

This section is for:

- *Policymakers taking decisions based on actuarial work and reports*
- *Journalists or media and communications specialists who want to report accurately on actuarial valuation processes*
- *General users with an interest in actuarial matters and social protection*

In this section, users will learn:

- *The importance of actuarial modelling for sustainable policy design of healthcare schemes as well as sickness and maternity benefit programmes*
- *The ILO intervention model for technical assistance in the actuarial field*
- *General features of ILO/HEALTH*
- *ILO standards, core principles and minimum benchmarks for health and maternity protection schemes*
- *ISSA-ILO Guidelines on Actuarial Work for Social Security*

The process of intervention for technical assistance in actuarial work

The effective administration of a healthcare scheme based on a sound long-term financial and actuarial perspective is crucial for ensuring its sustainability. The practice of conducting periodic actuarial valuations and assessing the expected impact of proposed reforms is central to operationalizing the State's responsibility under international social security standards. Actuarial valuations provide this long-term financial perspective for managers and planners of healthcare schemes. Actuarial reviews require the incorporation of long-term demographic and financial projections into the complex financial systems of healthcare schemes, which can only be done using models. ILO/HEALTH was developed to support actuarial and financial reviews or studies of statutory healthcare schemes. It helps to provide a quantitative basis for making policy decisions with respect to such schemes. The model also supports short-term cash benefit schemes to ensure income security during sickness or maternity. ILO/HEALTH enables:

(i) projections of future benefit expenditure and contributions base through year-by-year calculations;

(ii) determination of current and future financing needs, including contribution rates and tax transfers from the government;

(iii) simulation of scheme reserves;

(iv) assessment of the financial impact of changes in design parameters of schemes/programmes; and

(v) identification of factors to be considered when creating the required fiscal space for financing healthcare schemes.

The development of more powerful IT tools has vastly improved the dynamism and robustness of quantitative models in healthcare schemes.

The ILO believes that actuarial work and its linkage to policy design should be framed within international social security standards and comparative best practices. The ILO Social Security (Minimum Standards) Convention, 1952 (No.102), which served as the blueprint for the development of social security worldwide, states that periodically conducting actuarial studies and calculations is the main way in which governments can assume their responsibility for the sustainable provision of benefits. In particular, Article 71.3 of Convention No. 102 states that: "The Member shall accept general responsibility for the due provision of the benefits provided in compliance with this Convention, and shall take all measures required for this purpose; it shall ensure, where appropriate, that the necessary actuarial studies and calculations concerning financial equilibrium are made periodically and, in any event, prior to any change in benefits, the rate of insurance contributions, or the taxes allocated to covering the contingencies in question."

The International Social Security Association (ISSA), and ILO jointly developed *Guidelines on Actuarial Work for Social Security (*hereafter referred to as the *ISSA-ILO Actuarial Guidelines)* to provide guidance on the application of good practices in the administration of social security systems. The main objectives of the guidelines are to:

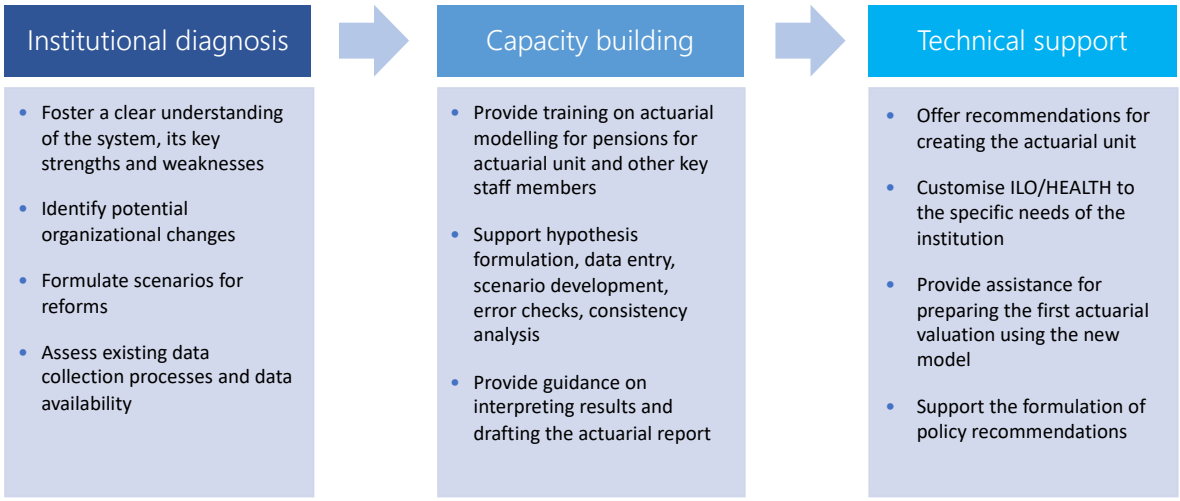
1. promote good practice in relation to actuarial work undertaken by and for social security institutions and to support efforts to improve accuracy, consistency and comparability of actuarial work;
2. provide guidance for the procedures carried out by actuaries in their work;
3. facilitate the work of institutions in their governance procedures relating to actuarial work;
4. improve the efficiency of actuarial procedures;
5. provide practical assistance to institutions to facilitate their compliance with actuarial standards; and
6. provide guidance to individuals or bodies responsible for policy issues and regulation on actuarial involvement.

The formulation of ILO/HEALTH and the methodological approach, as well as the work supported by the model and this manual, are framed within these international standards and good practices.

According to the *ISSA-ILO Actuarial Guidelines*, actuarial work should be adequately linked to national and institutional needs to undertake reforms and improve systems, both in the design of the schemes and managing institutions and in the building of institutional capacities.

Based on its experience of several decades, the ILO developed an intervention model for the actuarial field that covers three main processes: national or institutional assessment, capacity building and technical support (Figure 2).

Figure 2 – The ILO intervention model for technical assistance in the actuarial field



This intervention model is important because actuarial work in social security requires reliable diagnoses to better understand social health protection schemes and to develop appropriate policy scenarios. ILO/HEALTH is both an instrument for evidence-based policy formulation and part of a comprehensive process of intervention for technical assistance. In accordance with the ILO's technical assistance framework in the field of social protection/ social security, the relevant institutions should assume responsibility for the actuarial tools and generate local capacity as autonomously as possible. The ILO intervention model, therefore, considers capacity building to be crucial for the implementation of the model and subsequent assistance to ensure ownership of the actuarial work by countries and the responsible institutions.

ILO core principles and minimum benchmarks for health-related benefits

For the ILO, it is essential that actuarial work on social security and the resulting outcomes, including policy recommendations, are in line with the principles enshrined in the international social security standards developed by its tripartite constituents.

Over its century of existence, the ILO has promoted the core principles and minimum benchmarks enshrined in its standards when providing support to ILO constituents in designing or reforming their national social security systems. Having been adopted by government, employer and worker representatives, these standards constitute an internationally set reference for both policy design and implementation of social security systems.

Notably, these standards establish the principles of collective financing and risk pooling as the expression of social solidarity underpinning national systems. ILO standards relevant to health-related benefits include the *Social Security Minimum Standards Convention*, 1952 (No. 102); the *Medical Care and Sickness Benefits Convention* (No. 130) and its accompanying *Recommendation* (No. 134), 1969; the *Maternity Protection Convention* (No. 183) and its accompanying *Recommendation* (No. 191), 2000; and the *Medical Care Recommendation*, 1944 (No. 69), as well as the *Social Protection Floors Recommendation*, 2012 (No. 202). Access to both healthcare services

and income security during sickness and maternity is reflected in ILO standards as an integral component of social protection systems. Access to healthcare has further been recognised as a guarantee that should be protected through national social protection floors (R202).

In the framework of the 2030 Agenda for Sustainable Development, universal health coverage (UHC) is defined as ensuring that all people can access the promotive, preventive, curative, rehabilitative and palliative essential health services they need without facing financial hardship.[4] Social health protection, enshrined in ILO standards, provides a rights-based approach to achieving UHC. Mainstreaming UHC to ensure comprehensive coverage for all is the maximum expression of the right to health and social security.[5]

Social health protection has a dual objective: universal access to affordable healthcare of adequate quality, and income security in case of sickness.[6] In addition, ILO standards, especially the Social Security Minimum Standards Convention, 1952 (No. 102); the Maternity Protection Convention (No. 183) and its accompanying Recommendation (No. 191), 2000; and the Social Protection Floors Recommendation, 2012 (No. 202), identify income security during pregnancy and following child birth as a core component of social protection systems. To be adequate, income security in case of maternity should be provided for as long as necessary to guarantee the health of the mother and the child.

Like the other ILO social security standards, these standards are applicable worldwide and consider the different modalities in the design and provision of benefits as well as the different levels of development of national social security systems. Consequently, they are based on the premise that while there is no one-size-fits-all approach to social protection in general, including the provision of healthcare and related benefits, a set of core principles and minimum parameters (or benchmarks) can be established internationally to serve as a framework for guiding government action, even in the absence of ratification.

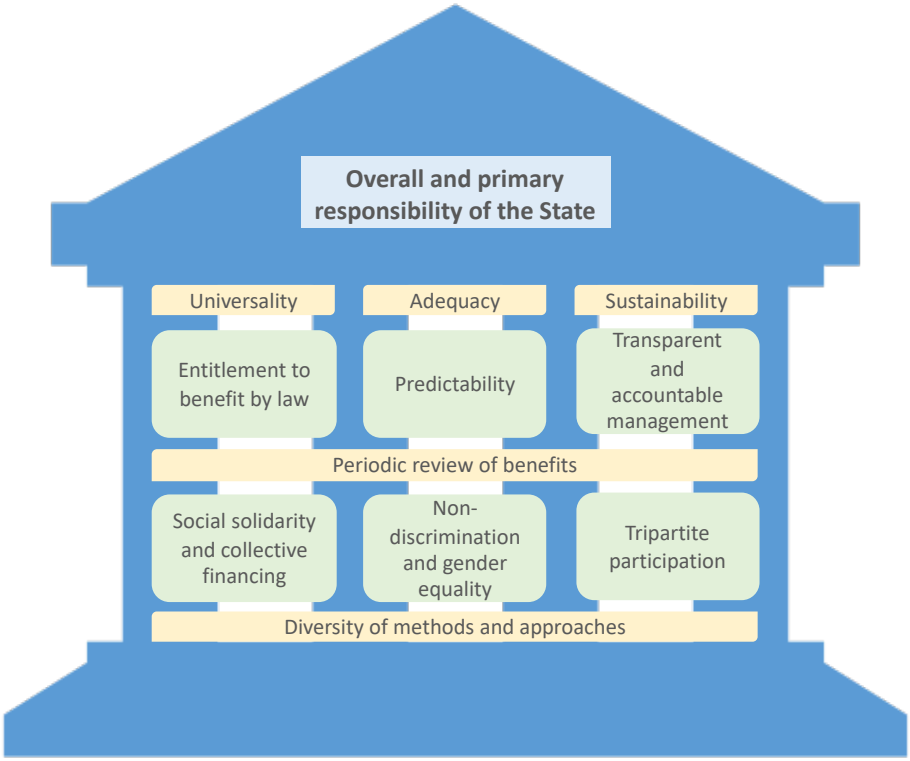
4 United Nations, 2019. General Assembly Resolution 74/2, Political Declaration of the High-Level Meeting on Universal Health Coverage: "Universal Health Coverage: Moving Together to Build a Healthier World", A/RES/74/2.

5 United Nations, 2019. Report of the United Nations High Commissioner for Human Rights, E/2019/52.

6 ILO. 2020. Towards Universal Health Coverage: Social Health Protection Principles. Social Protection Spotlight Brief. Available at: https://www.ilo.org/secsoc/information-resources/publications-and-tools/Brochures/WCMS_740724/lang--en/index.htm.

The core principles embodied in ILO standards can be grouped under the following categories:

Figure 3 – Internationally agreed-upon core principles in the ILO standards



The minimum parameters set in the standards include the scope and level of benefits and services offered, eligibility criteria and minimum coverage in terms of persons to be protected, the qualifying period needed for entitlement to benefits, as well as their duration.

In the case of healthcare, international standards provide guiding principles and parameters to achieve universal protection in a way that reflects risk-sharing, equity and solidarity – between income groups, men and women and generations – in a fiscally, economically and socially sustainable manner. Furthermore, healthcare should be provided both with preventative and curative aims and with a view to maintaining and restoring the health condition of the person protected. The standards also provide benchmarks to assess the adequacy of healthcare and related benefits, both in terms of access and scope. The guiding principles and parameters equally apply to sickness and maternity benefits, setting out the minimum for when and how to disburse these cash benefits when a person is unable to earn income as a result of ill health or pregnancy and childbirth.

Box. Useful resources for this chapter

ILO. 2020. Towards Universal Health Coverage: Social Health Protection Principles. Social Protection Spotlight Brief. Available at: https://www.ilo.org/secsoc/information-resources/publications-and-tools/Brochures/WCMS_740724/lang--en/index.htm

ILO. 2020. Sickness Benefits: An Introduction. Social Protection Spotlight Brief. Available at: https://www.ilo.org/secsoc/information-resources/publications-and-tools/Brochures/WCMS_744506/lang--en/index.htm

ILO. 2017. Building Social Protection Systems: International Standards and Human Rights Instruments. Available at: https://www.ilo.org/secsoc/information-resources/publications-and-tools/books-and-reports/WCMS_651219/lang--en/index.htm

Key ILO standards:

- Medical Care Recommendation, 1944 (No. 69)
- Social Security (Minimum Standards) Convention, 1952 (No. 102)
- Medical Care and Sickness Benefits Convention, 1969 (No. 130) and Recommendation, 1969, (No. 134)
- Maternity Protection Convention, 2000 (No. 183)
- Social Protection Floors Recommendation, 2012 (No. 202)

2. The actuarial valuation process in healthcare schemes

This section is for:

- *Managers or others involved in the development of new actuarial units in social health protection institutions*
- *Users engaged in actuarial work in social health protection institutions who want to obtain a perspective of the scale of the whole process*
- *Newcomers to actuarial practice in social health protection and social security*

In this section, users will learn:

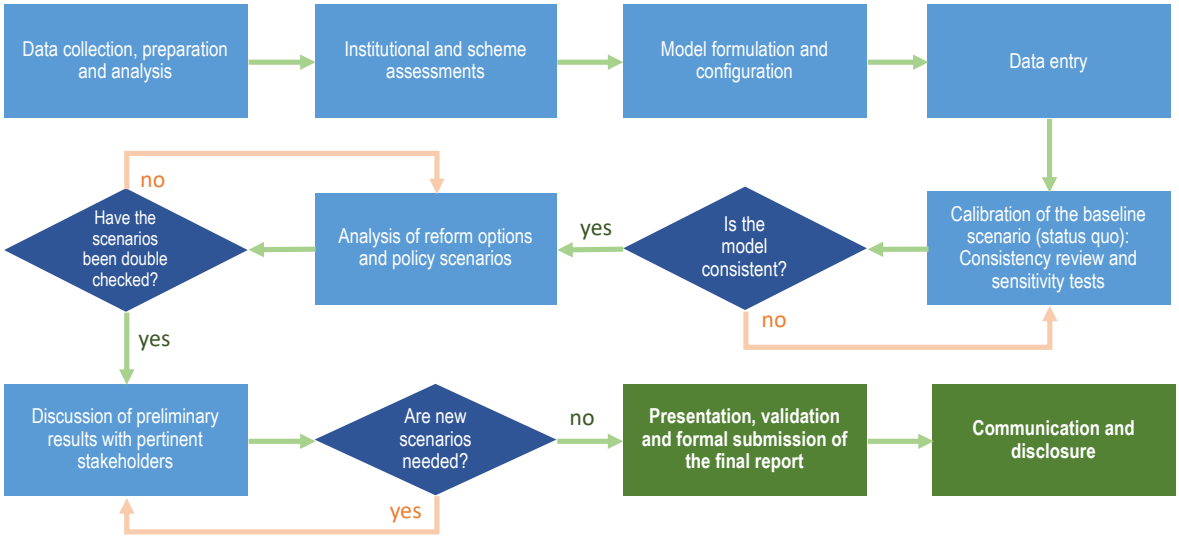
- *The stages of preparing an actuarial evaluation:*
  - *Data collection, preparation and analysis*
  - *Institutional and scheme diagnostics*
  - *Model formation and configuration*
  - *Data entry*
  - *Baseline calibration and consistency review*
  - *Analysis of reform options and policy scenarios*
  - *Stakeholder discussions*
  - *Actuarial report*
  - *Communication and disclosure*

It is extremely important that users prepare and review an actuarial valuation of a social security scheme in a systematic, meticulously organized way to ensure high quality results. Although the methodology and processes are standard, it is advisable to agree on their adequate definition to guide the actuarial valuation process developed by both social security institutions and external actuarial service providers.

Specifically, the process must comply with the international standards and guidelines of the International Association of Actuaries (IAA), and the *ISSA-ILO Actuarial Guidelines*, especially Guidelines 1-12 and 25-28.

This section describes the different stages of preparing the actuarial valuation and walks users through the steps to ensure that the actuarial valuation complies with international best practices, especially the *ISSA-ILO Actuarial Guidelines*. The section is not intended to replace the contents of the *ISSA-ILO Actuarial Guidelines*, nor does it attempt to cover all aspects of developing an actuarial valuation. Users who want more detailed information should consult Guidelines 1 to 12 of the *ISSA-ILO Actuarial Guidelines*.

Figure 4 – General workflow of actuarial valuations



As per the *ISSA-ILO Actuarial Guidelines*, each stage of the actuarial valuation should include a clearly documented peer review, specifying who is responsible for carrying it out, what the findings were and what measures were taken, if any.

2.1. Data collection, preparation and analysis

The proper organization and implementation of data collection, preparation and analysis is critical to ensuring reliable results throughout the process.

The data required for the operation of the actuarial model include the demographic and financial information of current active and inactive contributors, current and potential beneficiaries, the benefits to which they have access (cash benefits, healthcare packages, and health interventions), as well as the current rules under which the system operates and any expected future changes to them. The social security institution is responsible for ensuring that this information is updated, available and reliable.

Box. ISSA-ILO Guidelines on Actuarial Work for Social Security

Guideline 2. Data

In preparing a report, the social security institution ensures the availability of sufficient and reliable data necessary to perform actuarial work. The social security institution is responsible for the management of the data pertaining to the social security scheme participants and provisions, and compliance with data privacy legislation and national standards. The actuary provides an opinion on sufficiency and reliability of data, describes any modification made to data and the impacts of imperfect data on the social security scheme and its participants, and makes recommendations for improving the quality of data.

(…)

Principles:

- The social security institution should define responsibilities for data management within the organization including who is responsible for the management of the process and peer review processes.
- The data management process should ensure security of data (including detailing back-up procedures) and that any legal requirements regarding data privacy are respected.
- Data requirements should be documented and justified. These should take into account specific needs of the programmes that require actuarial work and the actuarial method and models adopted for the valuations. The documentation should: identify data elements; describe the use of data; provide sources of data.
- Social security institutions should have a well-documented and structured procedure on preparing data requests for external and internal data providers.
- Social security institutions should establish a well-documented and structured data validation process which will test internal data consistency as well as consistency with external sources (e.g. audited financial statements).
- Data collection should be undertaken using the seriatim approach. In a case where grouped data is used for the actuarial valuation, it is the responsibility of the actuary to determine the appropriate approach to group the data. The impact on the results of using grouped data as opposed to individual data should be assessed and communicated appropriately to relevant stakeholders.
- Lack of data, for example for a newly established social security scheme, presents a major challenge for social security professionals. In such situations, actuaries may need to rely on data from other sources and programmes. The actuary should coordinate with other agencies and stakeholders to ensure that the most appropriate data is used.

Entering data into the actuarial model requires information from different sources, not only from the social security institution, but also from other institutions, including household surveys, macroeconomic and social sector surveys, reports and databases. Coherence and consistency of information from the different sources must be ensured through a data review, analysis and cleaning process. Modern data science tools such as data integration and data visualization are instrumental to this process. The main sources of data required for the model include:

- **Official statistical information.** Consistency should be maintained between publications by the national institutions, including statistical yearbooks or other statistical or official database sources (economic, demographic, financial, etc.). Any discrepancies with the official information may later be questioned, also calling into question the results of the process.

- **Previous actuarial valuations**. The actuarial study should follow up on and analyse trends, conclusions and recommendations in previous studies. This also applies to events and decisions (actions) taken between the previous and most recent valuations. Any significant differences should be explained. According to Guideline 7 of the *ISSA-ILO Actuarial Guidelines*, "The valuation of a social security scheme includes the reconciliation of the value of the sustainability measures, financial indicators and other relevant results between the previous and current valuations. As part of the risk management of the social security scheme, the social security institution examines the main drivers of the changes in results between successive valuations." Sustainability measures, financial indicators and other results that can be reconciled may include, but are not limited to, relevant contribution rates, if the scheme is contributory; scheme reserves, if applicable; expenditures as a percentage of GDP and government expenditures, among others.

- **Financial statements.** Revenues, expenditures, reserve funds, interest revenues, etc. disclosed in the financial statements should be consistent with the actuarial valuation, especially in the early years of the projection.

- **Plans and programmes for the extension of coverage.** These plans and programmes should be consistent with the demographic and financial assumptions adopted during model formulation and should therefore be reflected in projection results. If the results of the actuarial valuation are inconsistent with any of these documents, the reasons for this should be clearly explained in the technical report.

- **Actuary's opinion on the data.** The actuary must issue their technical opinion regarding the sufficiency and reliability of the available data and clarify the adjustments made to the original data.

2.2. Institutional and scheme assessments

The formulation of actuarial work, in particular the design of policy scenarios, must be supported by a rigorous analysis of the institutional situation and the healthcare scheme parameters to be evaluated. This process includes analysis of the:

(1) social, demographic, macroeconomic and labour market environment, which affects sources of financing (productivity and wages, contributions, interest income from the reserve, inflation rates) and expenditure trends;

(2) legal and regulatory framework against the principles and minimum benchmarks established by ILO standards on social security (including the comments made by ILO supervisory bodies in case of ratification of a relevant Convention);

(3) governance in general, including the organization of political and administrative structures (see *ISSA Guidelines on Good Governance of Social Security Institutions*);

(4) administration and operational processes, including the strategic procurement of healthcare services, to identify areas of potential improvement that affect efficiency and results in terms

of adequacy/quality of healthcare services and other benefits, coverage and access to services and benefits, as well as contribution collection and administrative costs;

(5) the scheme's investment regime and functioning; and

(6) other areas of interest based on the specific requirements of the analysis.

Experts with relevant experience and expertise in health and maternity protection may participate in institutional and scheme assessments. The information needs to be detailed enough to inform the actuary who will lead the actuarial work, including configuration of the model and the operationalization of the policy scenarios to be simulated.

2.3. Model formulation and configuration

The formulation and configuration of a specific model must comply with a set of technical, actuarial and policy analysis requirements. This process should be guided by practical criteria that consider the existing evidence of problems identified in studies and analyses conducted before this stage. It should avoid abstract exercises and prioritize applicability.

Some aspects to consider while formulating a scenario:

Level of disaggregation of inputs and outputs required. This definition of this level is related to the final objectives of the model formulation in terms of the policy scenarios to be modelled. The availability of information or input data is also a determining factor in the level of disaggregation of the model inputs (for example, healthcare service costs, usually calculated with the participation of health economists). As a rule, the model aims for a level of disaggregation that best allows it to answer the relevant policy questions with the available data.

Assumptions. The definition of demographic and financial assumptions is one of the most sensitive issues related to an actuarial study. The *International Standards of Actuarial Practice 2* (ISAP2) provides a simple, practical criterion for their definition. "If the actuary sets the assumptions, the actuary should use neutral assumptions in a financial analysis of a social security programme. Neutral assumptions are such that the actuary expects that the resulting projection of the scheme experience is not a material underestimate or overestimate." Additionally, all assumptions must meet certain conditions. For instance, short-term assumptions cannot deviate significantly from recent experience.

Sufficiency and role of the actuary and stakeholders. According to Guideline 3 of the *ISSA-ILO Actuarial Guidelines*, assumptions used for the valuation of a social security scheme are sufficient to value the scheme in accordance with its financing objectives and consistent with the overall socio-economic environment of the country. The development of assumptions combines the analysis of historical trends with a forward-looking approach. Social security institutions assign major responsibilities to an actuary in the assumption-setting process. An actuary provides an opinion on the extent to which the assumptions used for actuarial work are reasonable and appropriate both individually and on an aggregate basis. By their nature, social health protection programmes cover wide segments of the population. Thus,

economy-wide and nationwide economic and demographic assumptions are often needed for the purpose of performing actuarial valuations. The development of assumptions is often a joint exercise that involves inputs from many parties: experts from the responsible institution, relevant ministries (especially the Ministry of Health), various governmental organizations and independent bodies of experts. Moreover, some of the assumptions may be prescribed by legislation or provided by various governmental organizations.

Cross-validation. Whenever possible, and to avoid misunderstandings, responsible institutions and other national counterparts should participate in the definition and validation of these assumptions, emphasizing the criteria they must meet for the results to be valid.

Consistency with current data available. The assumptions adopted should be consistent with both the information observed in the base year of the projection and with recent trends. If there are significant deviations, they must be adequately explained. The actuary's technical criteria play a pivotal role when analysing the evolution of the results of the actuarial and financial projections. For instance, the actuary needs to determine the extent to which existing commitments and obligations, such as investments made in the short and medium term with already established rates of return, can and should affect short- and medium-term assumptions.

Mutually consistent assumptions. The assumptions must be mutually consistent throughout the projection. For example, the average growth rate of healthcare costs or fees must be aligned with the average growth rate of insurable earnings and the economy as a whole. Although there are situations in which these relationships seem to be affected by external factors, there should be consistency when considering sufficiently long periods.

Existing plans and programmes. Existing plans that provide for future changes or adjustments, such as: extension of coverage to excluded groups, expansion of existing infrastructure, adjustment of health or cash benefits or benefit calculation rules, and modification of the investment portfolio, among others, should also be considered when defining demographic and financial assumptions and should therefore be reflected in projection results.

Nominal versus real values. The actuary should determine whether the model is formulated in nominal terms or in real terms. Both options are valid, but whatever the decision, the actuary must clearly state it when documenting the model and ensure that all calculations and results of the actuarial report are clear and consistent.

Opinion of the actuary regarding the assumptions. The actuary should issue a technical opinion on whether the assumptions adopted are reasonable and appropriate, referring to the assumptions both individually and collectively.

Definition of scenarios. As the additional scenarios respond to solutions to identified problems or to policies to improve management, coverage, adequacy, or compliance with international social security standards, among others, their definition should be made taking into account the opinion

of the organizations of the stakeholders involved in the administration of the social security scheme, which are usually workers, employers and government. This topic is discussed in more detail later in this section.

2.4. Data entry

Entering data into the model (variables, parameters, assumptions, and others) is often a laborious and tedious activity. Users should only begin this phase when they are fully confident of the specific objectives to be achieved by the formulation of a specific model. Monitoring and double-checking this process is critical.

Preparing the model inputs is a meticulous process that in some institutions may demand a significant effort, particularly the first time the necessary data set is produced. Health institutions must make an effort to produce accurate inputs of critical data, such as the unit costs of health interventions, or reimbursements to health providers, among others.

Generally, users reviewing the model should be different from users entering data. Alternatively, if more than one user is assigned responsibility for entering data into the different blocks of a model (context, internal demographics, rules and regulations, etc.), the technical team involved in the actuarial work can supervise and cross-check this process.

The data entry process for ILO/HEALTH is explained in section 5.5.3 of this manual.

2.5. Calibration of the baseline (status-quo) scenario: consistency review, sensitivity tests and reconciliation

Model calibration is the process of adjusting a model's inputs and parameters and putting in place constraints on the margins of certainties to obtain results that meet certain criteria. By adjusting the model's parameters, the calibration process allows to correct significant deviations from the observable values of the projection variables. Consequently, the calibration process requires sufficiently observed and credible historical data.

To address calibration, the actuary needs to have a clear idea about the purpose of formulating a given model. The degree of complexity of the calibration process is directly related to the degree of complexity of the model. Accordingly, the calibration process requires the judgement of a professional actuary, which is usually developed through professional training and years of experience.

Usually, the model should be able to reproduce, to a certain degree of accuracy, results observed in a recent period. There are no specific rules on how to calibrate an actuarial model, and this is where the professional experience of the actuary becomes critical. But as a first step, the model, along with its parameters and assumptions, should reproduce with some accuracy the demographic and financial results observed for the first year of the projection, the fraction of the year with available results, or the observed results of several previous annual periods if the projection period

begins in a period prior to the current year. An alternative method, not included in ILO/HEALTH, is to run a back projection, i.e., go back in time to reproduce the values observed in the years covered by the back-projection exercise.

2.5.1. Consistency review

The calibration process discussed in the previous section must be accompanied by a rigorous consistency review of the results for the whole projection period to identify explanations or unexpected deviations. This part of the process is critical to ensure the success of the actuarial valuation. Section 7 offers a detailed discussion of the consistency tests supported by the projection indicators generated by ILO/HEALTH.

The review process should address consistency of results in two areas. First, the trends in the main demographic results, such as the projection of scheme beneficiaries; coverage rate; age structure; active and inactive contributors (where applicable) according to the size of the labour force, which should be consistent with the assumptions by population group, sex and year of projection; and others. Second, the trends in the main financial results, such as the pay-as-you-go (PAYG) rate, expenditure growth rate, expenditure distribution and proportion of administrative expenditure, among others, in accordance with the set of hypotheses adopted.

2.5.2. Sensitivity tests

The objective of sensitivity tests is to study the impact of the various sources of uncertainty in a quantitative model. Unlike the consistency review, which aims to verify the internal consistency of the results and detect possible modelling problems, sensitivity tests determine how the different values of an independent variable affect dependent variables under a given set of assumptions. The analysis can include one or more input variables.

In the case of actuarial valuations for healthcare schemes, the following sensitivity tests are recommended to measure the impact on the main financial indicators (balance sheet, PAYG rate and others):

- changes in inflation rate
- changes in wage growth rate if the healthcare scheme is contributory
- changes in GDP growth rate
- any other variable considered important in a particular scenario.

The results of sensitivity tests should be analysed with extreme caution and preferably discussed with the technical team assisting in the actuarial valuation. If it is determined that there are variables that may have a significant impact on the level of certainty of the results, these tests and results should be mentioned in the actuarial report.

2.5.3. Reconciliation

When previous actuarial valuations are available, it is useful to reconcile results obtained in the current valuation with those of previous valuations, especially the most recent one. This exercise not only helps to identify risks not foreseen in previous valuations, but also contributes to the accuracy of the results.

Guideline 7 of the *ISSA-ILO Actuarial Guidelines* contains some results that can be reconciled between these valuations.

2.6. Analysis of the baseline scenario and discussion of reform options and policy scenarios

The baseline scenario analysis is important for identifying unwanted situations that may arise in the future. To this end, it is essential to consider not only the results of the baseline scenario projections, but also the institutional and health system assessment (discussed in section 3.2). While the list of potential problems to be identified may be broad, it should not be limited to items directly related to income and expenses. The adequacy of benefits (sufficiency, timeliness, duration and revision of benefits) and coverage should also be analysed, as well as possible management problems associated with the collection of contributions, administration and investments.

This analysis should consider compliance with the principles of social security, especially with the ILO conventions ratified by the country, specifically Convention No. 102 concerning social security minimum standards.

Once the potential problems and situations to be corrected have been identified, solutions must be found. These solutions should be discussed with social partners and translated into policy scenarios to evaluate their impact. This scenario evaluation exercise will provide important information for decision-makers.

The analysis of reform options and policy scenarios is a key objective of quantitative modelling in actuarial science applied to social health protection. This stage is therefore critical and usually constitutes the point of greatest interest to users of actuarial reports, namely strategic decision-makers.

Policy scenarios respond to a need for solutions to existing problems or policies to improve management, coverage, adequacy or compliance with international standards, among others.

The development of policy scenarios has two stages: formulation and analysis. Formulation relates to deciding on which policy options will be used to make projections (scenarios) while the analysis stage seeks to explain results, deviations and their causes. Both stages interact to provide mutual feedback. This means that the results of the analysis of some policy scenarios may lead to the decision to explore, formulate and analyse new scenarios.

Scenario formulation and analysis should be done considering the opinion of both (a) the organizations involved in the administration of the health scheme (usually worker, employer and

government representatives for social health protection schemes, and representatives of beneficiaries or patients); and (b) the staff working on the actuarial valuation. Transparency at this stage is essential to achieve the expected results. This is especially true with respect to actuarial valuations, which are part of social dialogue processes to introduce social security reforms. It is important to involve social partners in this process to gain their inputs and confidence in decisions made.

The following is a list of typical examples of policy scenarios:

- variations (increase or decrease) in contribution rates, in contributions from a particular sector, or in government transfers;
- extension of a scheme's coverage, usually to include new populations, such as the non-covered population or specific groups such as workers in the informal economy, rural workers or migrant populations;
- modifications in the level of benefits, benefit costs or in the conditions for the adjustment of benefits: healthcare packages or specific healthcare interventions, healthcare utilization rates, growth rate of costs, per-capita costs, co-payment levels, minimum and maximum levels of a specific benefit and modification of criteria for fees paid to healthcare providers, among others;
- variations in the requirements to access programme benefits, such as waiting periods and minimum contribution periods, among others; and
- in the case of contributory schemes, variations in the amounts of salaries or income subject to social contributions: minimum contributable salary or salary contribution ceilings.

2.7. Discussion of preliminary results with pertinent social partners

The results of actuarial valuations are often key inputs for decision-making at the level of both the institution responsible for the scheme and at the level of the policy on overall social protection and health systems. To this end, the preliminary results of the work, including the successive rounds of scenarios evaluated, should be discussed with relevant social partners. This includes representatives of the protected persons and those involved in financing the scheme under evaluation.

An actuarial valuation is merely a tool; final policy decisions are in the hands of others. For this reason, there must be transparency in the understanding of the intermediate results of the actuarial exercise by those who will ultimately make the decisions. It is the actuary's responsibility to guarantee the transparency of the process, which includes maintaining an adequate level of communication with the social partners responsible for decision-making.

Throughout the process, the intermediate and final results of the actuarial study must be shared with those *not* using all the technical instruments required for this type of exercise. That is why it is

crucial to communicate information on results in simple, clear language, although without ignoring the technical perspective or objectivity.

2.8. Presentation, validation and formal submission of the final report

Actuarial reports are a fundamental part of the actuarial valuation work as they are the main means by which the results of the process are communicated to decision-makers and health insurance authorities, in the form of conclusions and recommendations. The actuarial report should be prepared in accordance with Guideline 9 of the *Actuarial ISSA-ILO Guidelines* (see box).

Box. ISSA-ILO Guidelines on Actuarial Work for Social Security

Guideline 9. Reporting

In preparing a report on the actuarial valuation of a social security scheme, an actuary considers legislative requirements and relevant professional standards and guidance, as well as the intended audience.

A report on the actuarial valuation of a social security programme could be considered as a final product of the actuarial valuation process. It is a tool that provides stakeholders with information necessary to make responsible decisions with respect to a social security scheme. As such, a social security institution as well as the actuary should make every effort to prepare a comprehensive, transparent and explicit report on the actuarial valuation. This guideline should be read in conjunction with Guidelines 11, 25, 26, 27 and 28.

Principles:

- The report on the actuarial valuation should contain sufficient information to permit the conduct of the independent expert review (see Guideline 11) and to allow stakeholders to make sound decisions based on the results set out. It should be written in such language as to be understandable and unambiguous for all stakeholders, including those without an actuarial background.
- The report on the actuarial valuation should contain an opinion describing the actuary's views on the appropriateness of data, assumptions and methodology as well as other material elements of the performed work. This opinion should be signed by an actuary who fully meets the professional requirements for making such an opinion as set down by the national actuarial organization and recognized by the International Actuarial Association.
- The social security institution should ensure that reports on the actuarial valuation as well as any supplemental information with respect to the actuarial valuation are available in all relevant languages.
- Additional communication may be required in order to address needs of a more technical nature as well as to facilitate the understanding of the report by stakeholders.

Actuarial reports for healthcare schemes are much more than descriptions of model results. The key message of an actuarial report is whether a scheme will be financially sound in the short, medium and long term. Although the ILO actuarial models provide a solid base on which to formulate perspectives regarding the financial soundness of schemes, models can only serve as a support and should not be expected to replace sound judgement and experience. This assessment of soundness, as well as the choice of methods and assumptions used for modelling, depend largely on the personal judgement of an informed and experienced technical staff.

The presentation of the results should show the calculations and projections for the baseline scenario (status quo), as well as for the other scenarios, and explain the rationale behind their

formulation. Actuarial studies of social health protection schemes should show the short- and medium-term results (at the most, a 15-year period); however, it is advisable to make longer-term projections occasionally. Reasons for this include the estimation of the healthcare demand structure in the long term to gradually adapt the system. Actuarial reports should be clear and accessible to facilitate their understanding and use by other professionals who are unfamiliar with actuarial issues.

Actuarial reports usually include the following:

- The reason for the actuarial valuation and a description of recent scheme developments.
- The social, demographic, economic and political context underlying the scheme.
- A description of the provisions of the healthcare scheme or schemes to be evaluated in terms of legislation, rules and regulations, the ILO social security conventions ratified by the country (especially Convention No. 102 of Minimum Standards) and the analysis of their compliance. This includes coverage, nature of the scheme (e.g., contributory or non-contributory), source of funding and benefit provisions (e.g., contingencies covered, formulae, amounts, restrictions and eligibility conditions).
- Methodology, data and assumptions. Overview of the actuarial valuation model (ILO/HEALTH). The methodology used, technical bases, the demographic, economic and financial hypotheses adopted, and the scenarios, including data annexes and methodological annexes, where necessary.
- Results and findings. Projected demographic values at selected future points in time. Financial projections showing cash flows and balance sheet values for the recent past and for the future.
- Analysis of results, including demographic and financial projections based on status quo conditions that yield a financial analysis of the scheme. Reconciliation with the previous actuarial report, along with explanations of significant changes in results. Discussion of the pattern of financial projections and its implications. Sensitivity of results to variations in one or more assumptions. Findings with respect to the short-and medium-term financial sustainability of the scheme with due regard for any funding rules.
- Financial analysis of reform options and scenarios.
- Discussion of the impact of reform options and scenarios and the formulation of final reform strategies.
- Conclusions and recommendations on the adequacy of the legal framework, compliance with international standards, administration, reform options and political scenarios, including:
    - adequacy of current or proposed contribution rates;

- efficiency of benefit provisions;
- adequacy of benefits;
- performance of the administration and level of administrative cost; and
- investment policy and performance (safety, return, liquidity), if applicable.

- An appendix containing baseline data, detailed results and the methodological basis of the estimates.

The report's structure and content must comply with both the IAA's *International Standards of Actuarial Practice 2* (ISAP2) (section 3.1 and appendix) and *the ISSA-ILO Actuarial Guidelines* (section D on Reporting, Communication and Disclosure and other related guidelines). The appendix to ISAP2 describes the possible contents of the actuarial report, considering the financial system and valuation method used.

In addition to the specific content of the actuarial reports, these standards address critical issues such as:

- The frequency with which actuarial studies should be carried out and the relationship that this frequency has with the nature of the healthcare scheme to be evaluated, including external actuarial valuations or peer-reviews.
- The circumstances under which the frequency of these studies should be increased.
- Since it is necessary to share the information on the actuarial valuation with the interested parties in the scheme (workers, employers, protected people, etc.), the institution managing the health scheme should adopt a policy for communicating actuarial reports.
- Actuarial information should be communicated at a technical level tailored to the target audience to ensure that it is easily understood and used.

Ideally, national regulations should officially establish that the responsible institution should prepare actuarial valuation reports using internal technical resources (an actuarial department or unit), or that a third party prepare them, if appropriate. These should comply with the IAA's international ISAP2 standards, and with the *ISSA-ILO Actuarial Guidelines*. Additionally, dialogue should be established with other institutions in the social protection system, especially with the healthcare system's regulatory and oversight institutions, if they exist. In some countries, there are public institutions or bodies responsible for defining the structure of the presentation of actuarial reports.

2.9. Communication and disclosure

Communication is an important component of actuarial work. The social health protection institution and actuaries must provide accurate, relevant and timely information to ensure sound reporting and communication processes.

The *ILO/ISSA Actuarial Guidelines* (Guidelines 25-28) address communication and disclosure aspects of actuarial reports, such as communication between board members, management and the

actuary, the reporting process, responsibilities of the social health protection institution with respect to reporting and communication, including the correct form of technical and non-technical communication depending on the audience. Ideally, there should be legislative deadlines with respect to the results of the actuarial valuation and their transparent communication to social partners. Social security institutions, with the support of the actuary, should meet these deadlines.

Social health protection institutions are responsible for reporting and communicating changes in the provisions of the scheme, which usually form part of actuarial analysis and reports. The actuarial situation of social security programmes should therefore be reported regularly, in a timely, comprehensive manner, particularly where the sustainability and adequacy of benefits may be compromised.

Due to the technical complexity of actuarial work, communication of the results of actuarial valuations should be tailored to the specific needs of each audience, such as congressional representatives, members of the institutions' boards of directors and senior technicians of the institutions, among others. The publication of the results of actuarial valuations may be accompanied by a communication (e.g., a press release or an executive summary) that summarizes in simple language the main conclusions, policy options and recommendations of the actuarial valuation.

3. Main features of ILO/HEALTH: A methodological overview

This section is for:

- *Managers who want to use the outputs generated by ILO/HEALTH to substantiate policy recommendations with evidence to decision-makers*
- *Individuals conducting actuarial work in social health protection who want to learn more about the inputs and outputs of the model*
- *Actuarial experts who want to be informed of the data requirements of the model*
- *General users and newcomers to actuarial practice who want to learn the specifics of ILO/HEALTH*

In this section, users will learn:

- *The technical specifications of ILO/HEALTH*
- *The structure of ILO/HEALTH's modelling framework: phases, inputs, outputs*
- *Definitions of basic concepts used in the model*
- *The main functional processes in the model: users, models, scenarios and reporting*

3.1. General overview

ILO/HEALTH is part of the ILO Quantitative Platform of Social Security (QPSS). This platform contains a set of calculation, simulation and analysis tools, both actuarial and non-actuarial.

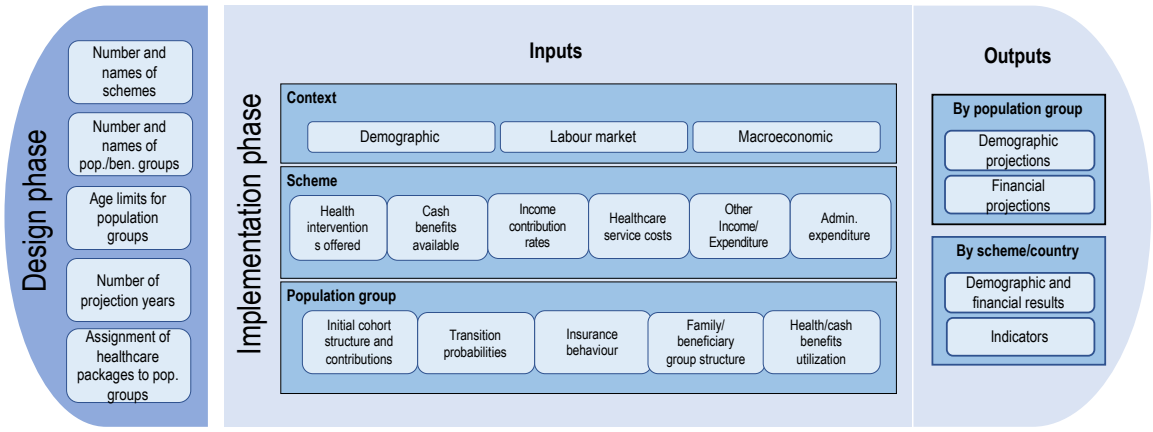
The QPSS is equipped with a central administration tool (the CAT tool), which allows varying levels of control over operations related to the use of the different quantitative tools. These operations include registration of social security institutions, users, process control, data control and IT security in general. Individual and institutional users have private workspaces to ensure the confidentiality of the information managed in the different tools. The ILO is committed to guaranteeing the security and confidentiality of the data stored on the platform.

The QPSS is a service whose IT security and consistency comply with ILO standards. The QPSS is an MS Azure cloud-based service that provides users with an actuarial-as-a-service model (SaaS infrastructure model) within a multi-layered and responsive tool to be consumed in a secure web-based environment.

3.2. The building blocks of the modelling framework

ILO/HEALTH is constructed on a basic set of building blocks. Understanding these building blocks is crucial to modelling and obtaining the desired results (see Figure 5).

Figure 5 – ILO/HEALTH: Overview of the modelling framework (building blocks)



Work in the model is done in **two phases**:

The first phase is the **design phase**, where users establish parameters in the platform to set up their definitions of different models. Users need to first discuss and analyse the critical aspects of setting up a particular actuarial model. To this end, users should define the *schemes* they are going to model, the *population groups* belonging to each scheme and the *age limits* of each population group within the scheme. For each scheme, users need to create at least one group of active contributors (in the case of contributory schemes). Every scheme also automatically creates a set of *beneficiary groups*: contributors, pensioners (when this option applies) and protected dependent family members. Users set the *projection period* and the *method of calculation of results* in nominal or real terms. A critical stage in the design phase is the *configuration* of the healthcare packages and their linkage to population groups. Sections 5.6 and 6.1.3 provide more details on these decisions and how to operationalize them.

ILO/HEALTH creates an initial definition of the healthcare scheme(s) and, if applicable, the sickness and maternity cash benefit schemes that make up a national system. A national system may include one or more schemes functioning at the national or sectoral level. Thus, there can be national single-scheme models and multi-scheme models. Each scheme has its own rules and population groups.

The second phase is the **implementation phase** of the modelling process. Once a model's parameters are set, users can create baseline and policy scenarios and scenario matrices with relevant information for the projection exercise.

INPUTS: Inputs help to simulate the demographic and financial dynamics of the population groups. Inputs relate to: 1) context: mainly related to the national demographic, labour market and macroeconomic situation in which the schemes function; 2) the scheme's characteristics: eligibility conditions, services and benefits available (their costs and calculation formula), contribution rates, income and administrative expenditures; and 3) population group characteristics: initial contributions, structure and transition probabilities (including those of inactive contributors and all beneficiary groups) and key information on the healthcare and cash benefit demand.

- The **context** is a set of national-level variables and parameters. These include projections of the national population by sex, rates of participation in economic activity by sex, and a set of basic parameters for the macroeconomic framework, including GDP growth rate, inflation rate, salary growth rate and interest rate.

- **Scheme inputs.** On the beneficiary end, the scheme rules determine who has access to the scheme's benefits, how much they cost and how they are calculated. Scheme inputs are also characterized by a set of rules that determine who pays contributions (if applicable), the period during which they do so and the proportion of earnings paid as contributions.
  Regarding *health schemes and institutional rules*, ILO/HEALTH creates an initial definition of the healthcare schemes that are part of a national health system, which may include one or more schemes functioning at the national or sectoral level. Thus, there can be national single-scheme models and multi-scheme models.

  Typically, a scheme can have different rules and specific populations covered in relation to other healthcare schemes. At the model level, specific healthcare schemes are associated with certain population groups, eligibility criteria for access to healthcare services, differentiated healthcare packages, one or more payment methods, a specific definition of costs or user fees (reimbursement fees to healthcare providers, considering co-payments and specific frequencies of use of healthcare services).

- In terms of **population groups**, inputs are the initial composition of the different groups, their different transition probabilities (probabilities of moving between populations groups within the scheme or from other schemes), their dependency situation and relevant cash flows from the scheme's perspective (salaries or income, including pensioners' income when applicable), and their interaction with benefit providers in the form of utilization or demand curves.

  ILO/HEALTH places emphasis on the following characteristics of population groups: i) their initial composition and expected transition over time; ii) their insurance status (the probability that the group will achieve the minimum contribution period to become insured) and the extension of the insurance status to their family dependants groups; and, iii) their demand for benefits –healthcare services as well as cash benefits when available.

OUTPUTS: ILO/HEALTH allows users to generate an extensive set of reports for different uses and needs in terms of analysis and policy design. Relationships between inputs allow the model to project outputs. There are two main groups of outputs: outputs at population group level (demographic and financial projections), and scheme- or country-level outputs.

Output matrices have several levels of detail, as will be discussed later. The first type of output corresponds to **demographic projections** at the population group level. Demographic projections interact with other inputs to estimate financial projections at the population group level. These contain average values of salaries, new benefits, total benefits and estimates of the main cash flows associated with each demographic group. In time, **financial projections** at each demographic group level are combined with other inputs to enable the model to prepare financial reports and demographic and financial indicators at the scheme and country levels.

All intermediate and final calculation outputs can be displayed, copied and transferred outside the model (csv or xls), including year-by-year and age/sex breakdowns. The final outputs include demographic and financial flows projected in absolute values, such as directly contributing populations, eligible populations, scheme revenues and expenses, and actuarial technical reserve levels, among others.

These indicators can be used both to support model calibration and consistency testing and to aid in results analysis and reporting. These outputs include a set of indicators useful for performing a step-by-step consistency test.

3.3. Basic concepts used by ILO/HEALTH: An introduction

Before working in ILO/HEALTH, users should have a firm grasp of some basic concepts, such as model, scenario, scheme and population group. The definitions of these concepts may vary from one country to another, therefore the definitions of each concept as per ILO/HEALTH are provided below.

Model. A model is a quantitative formulation specific to a country's social health protection system. It includes general definitions (i.e., model description, which users are authorized to use in the specific model application, projection period, and others) and specific definitions for each of the health care schemes and programmes included in the model (i.e., scheme rules, populations covered and others). Therefore, a model configuration can include general definitions and parameters common to many different schemes and programmes operating in the country, as well as the specific features of each scheme and programme comprising the model at the country level.

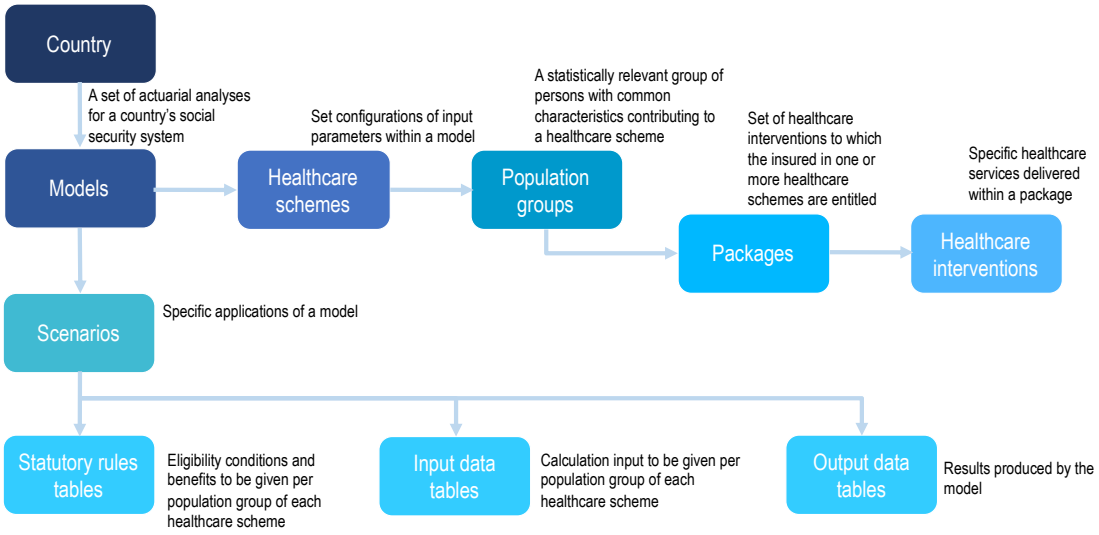
Scenario. A scenario is a specific formulation of a model under a certain set of parameters. Each scenario differs from all others in terms of parameters that define statutory rules, population biometrics, specific statutory rules and others. A single model may contain several scenarios to reflect a variety of conditions in which the model plays out. Users with editing rights can create scenarios. A user with editing rights can create scenarios to simulate the financial impact of parametric changes to the scheme or programme.

Baseline scenario (status quo scenario). It is a good practice to formulate a "baseline scenario", i.e., a scenario of the healthcare scheme(s) included in the specific model formulation, assuming current conditions with no changes or reforms in parameters and the most plausible developments in demographic and financial terms. A baseline scenario is essentially a scenario reflecting the status quo, with no changes to legislation (statutory rules), coverage, level of benefits, salaries or other variables. Once the baseline scenario has been formulated and calibrated, any alternative scenarios serve to compare the results of certain simulations, typically policy scenarios, with those reflected in the baseline scenario.

Population group. Each healthcare scheme may cover one or more population groups. ILO/HEALTH can create scenarios related to the extension of a scheme or programme to one or more uncovered population groups. One aim of ILO/HEALTH is to analyse the impact of policies on specific populations, such as civil servants, private sector employees, the self-employed and others covered by the same scheme or programme. The decision to define more than one population group in a specific model is limited by the availability of specific data to feed the model for each of these population groups separately. Therefore, before defining the population groups, users must determine whether the management information system supporting the scheme's administrative operations can generate separate datasets for each population group.

Healthcare packages. In ILO/HEALTH, healthcare packages are the sets of healthcare interventions to which protected persons under one or more healthcare schemes are entitled. Each scheme and its respective population are linked to specific healthcare packages. Several healthcare schemes in the same country (same model) may have one or more healthcare packages in common, while others may not. Within ILO/HEALTH, each healthcare service package has a unique associated payment method. Hence, in the case that a given protected population group is entitled to a range of healthcare interventions that have different provider payment methods (for example inpatient care paid on a case-based basis and primary care paid on a capitation basis), one healthcare package per payment method must be created. Users can then link both with the population group. Users can define each healthcare service package, with its respective list of specific healthcare interventions, provider payment methods, fees/costs of each healthcare intervention and co-payment levels, if any.

Figure 6 – Overview of the relationships between models, scenarios, schemes and population groups



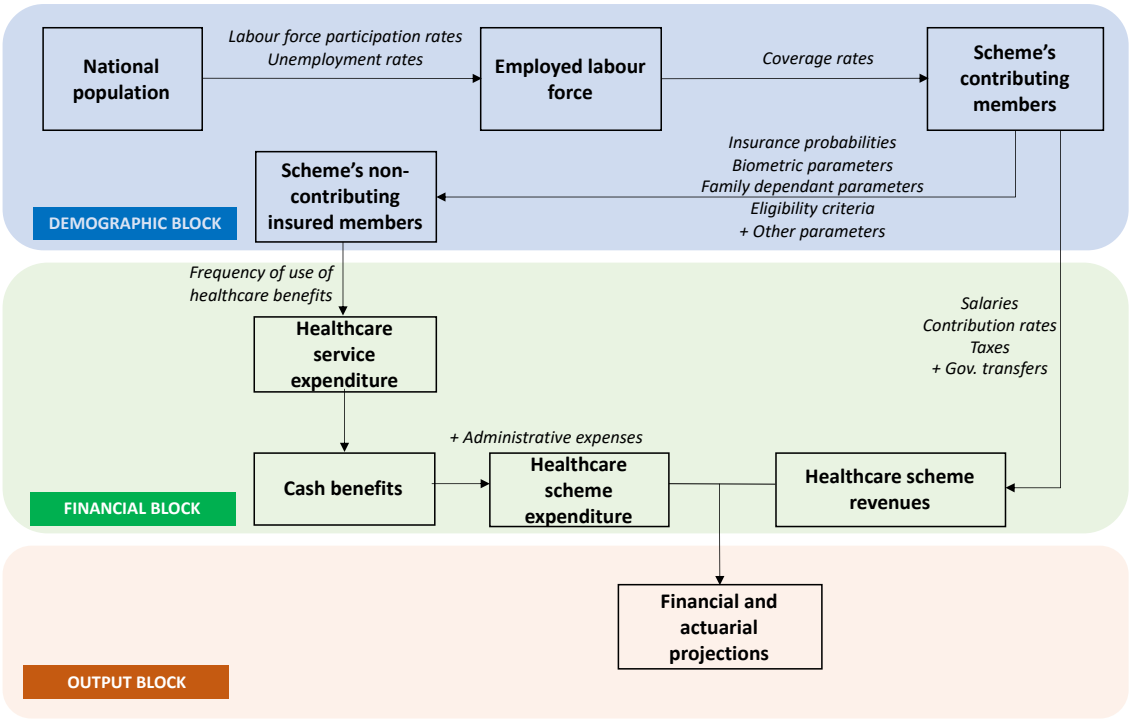
As shown in Figure 6, the definition of the different schemes, their associated populations and conditions for entitlement to certain benefits, are critical elements when designing a new actuarial model for country application using ILO/HEALTH. Ideally, this work should be carried out by a multidisciplinary team, with an emphasis on the final objectives of the policy analysis. Design features and parameters of each scheme must be known and described accurately for the actuary to carry out the analytical work. The same is true for the formulation of scenarios to simulate parametric changes.

Although users can redefine a model practically in its entirety, the work of formulating a new actuarial model can be quite laborious and time-consuming. Before starting to work with ILO/HEALTH, users should carefully discuss and design the parameters and configuration of the model. The simplest way to do this is to begin with a step-by-step approach, starting with a model that includes only one healthcare scheme. When this model is calibrated in its baseline scenario, users can then decide to move on to the next stage of adding new schemes and scenarios. A stepwise approach to modelling population groups is also recommended, starting with a model of a single healthcare scheme and a single population group (e.g., the "general healthcare scheme" of the country) until the baseline scenario is calibrated. Users can then continue adding elements, including more populations (if required and if specific data are available for each population) and more schemes.

3.4. General flow of the calculation algorithm

Although ILO/HEALTH may be mathematically complex internally, the general logic of the calculation algorithms is relatively straightforward. Figure 7 presents an overview of the steps involved in preparing annual projections.

Figure 7 – Overview of the calculation flow (a simplified flow)



In general terms, the logic of the projection flow can be described as part of three blocks: demographic block (inputs), financial block (inputs) and projections (outputs). ILO/HEALTH can manage projections for both contributory and non-contributory schemes. Since the architecture and related financial flows are more complex for contributory schemes, the tool and guide are adapted to this complexity across the three blocks. Users managing non-contributory schemes should not be intimidated by ILO/HEALTH terminology.

In the case of modelling for non-contributory schemes, the demographic and financial blocks are simplified, as by applying general coverage rates of the national population, one moves directly to calculating protected groups and health services demanded.

3.4.1. Block 1: Demographic block

The demographic block is composed of the estimation of the general populations and scheme-specific populations:

1. **National population.** To ensure the overall consistency of the population projections, a safe starting point is to input a national population projection distributed by sex into the model. This projection can be obtained from official national sources. In the absence of official national projections, the UN World Population Prospect database is a reliable source of these projections.

2. **Employed labour force.** The hypothetical and projected labour force participation rates and unemployment rates are applied to the population to project the employed labour force. Most national statistics offices prepare these types of projections, which can be used as inputs for the model. Hypotheses on the future behaviour of these parameters should consider the main factors affecting their evolution: change in female labour force participation rates; urbanization trends; size of the agricultural, services and manufacturing sectors; coverage of the education system; coverage of health insurance systems; and current and expected trends in levels of labour informality, among others. This information is not paramount if the health scheme is not based on social contributions. Even if the scheme is non-contributory or is based on contributions that are not related to wages, this information can be entered into the model as it brings an interesting perspective to the final analysis of the simulated scenarios.

3. **Scheme's contributing members.** Based on the employed (occupied) labour force, the coverage rates of each scheme are applied to obtain a projection of the schemes active contributors. Usually, this refers to the active member paying contributions. In the case of non-contributory schemes, it refers to the family member enrolled in the scheme who is the entry point for coverage of the entire family group. The information should be provided disaggregated by sex for each health scheme, separately. Hypotheses on future trends in coverage rates are constructed based on expert judgement, ideally in consultation with specialists from multiple disciplines. International experience is always a useful reference when formulating these hypotheses. Hypotheses on labour force and contributory or non-contributory coverage play a central role in the formulation of the model because they serve as reference variables for controlling the remainder of the demographic projections calculated endogenously by ILO/HEALTH.

4. **Scheme's non-contributing insured members.** A feature of most healthcare schemes is that while contribution does not guarantee protection (given, for example, the existence of a waiting period), the contributor's own contributions are not the only means to achieve healthcare protection. By forming the protected population based on the whole set of individuals with rights to access healthcare services, the model also considers the residual periods from past contributions and the extension of protection to non-contributing family members. In the case of a fully non-contributory scheme, where affiliation is based on registration of a head of household (whose information is entered in the "scheme's contributing member"), the "scheme's non-contributing insured members" comprise the remainder of the protected household members.

3.4.2. Block 2: Financial block

The financial block requires the calculations performed in the demographic block. Using certain assumptions, this block estimates:

5. **Contribution revenues.** Contribution revenues, if applicable, are derived from information on salaries and the demographic projection of contributors (i.e., average amount of contributions of demographic groups). Salaries are weighted by age and sex. Salaries are estimated based on the interaction of previous surviving contributing groups and new entries. The salary structure is a weighted average of theoretical salary structures and observations from the most recent available records. Government transfers, where they exist, can be incorporated into each healthcare scheme. ILO/HEALTH also allows for associating an "other income" item to each scheme.

6. **Healthcare scheme expenditure.** Expenditures are derived from information on the population with the right to healthcare services and depends on the payment method of these services: the frequency and costs of their use, the per capita cost of their financing, or the budget allocated to their payment.

7. **Cash benefits.** These are estimated in the same way as health benefits. Their cost is usually lower than that of healthcare services. These estimates use information on frequency of use and calculation formulas established in legislation.

3.4.3. Block 3: Projections

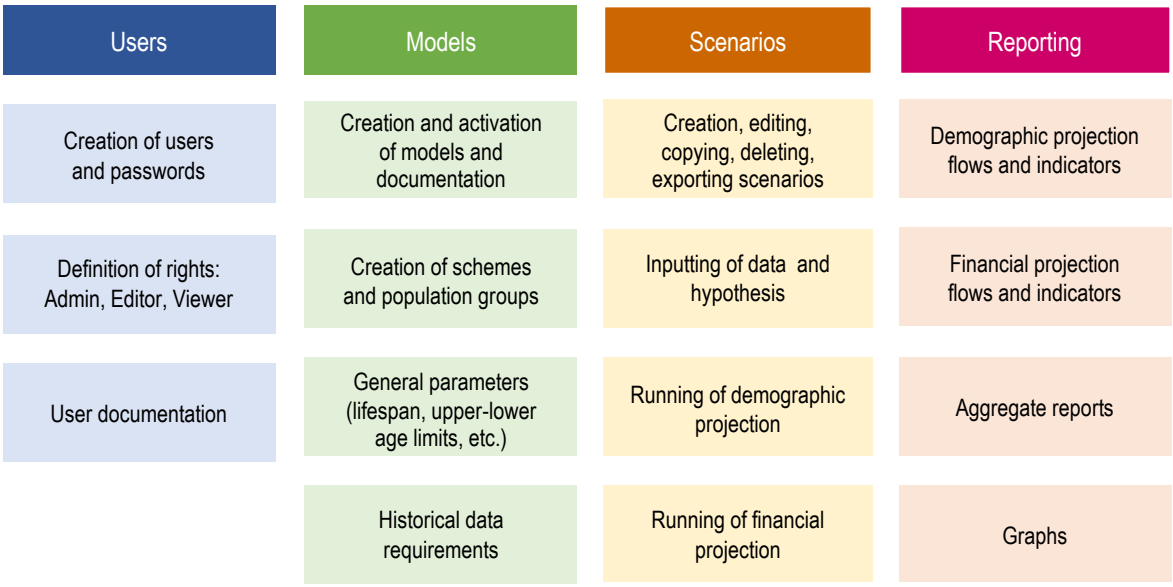
By combining the steps above, this block enables users to:

8. **Project administrative expenditures.** These are assumed to be a set percentage of benefit expenditures and use the assumptions regarding other revenue and expenditures applied directly to the cash flow, enabling ILO/HEALTH to estimate the full set of cash flow projections of the model.
9. **Calculate actuarial/financial results and indicators.** ILO/HEALTH is capable of generating and displaying a wide range of output variables and indicators, including demographic, financial and actuarial. This includes projections of the populations covered (directly insured and dependent family members) by population group, sex and age; health care expenditures by sex and age; revenues from members contributions by sex and age; financial flows of income and expenditure; financial results of operations; and actuarial, coverage and revenue and expenditure indicators.

3.5. Functional processes: Configuration / Models / Scenarios / Reporting

An operational approach to using ILO/HEALTH refers to the major functional processes supported by the tool (Figure 8).

Figure 8 – Overview of the main functional processes



3.5.1. Administration of users

To use a specific model, it must first be created on the IT platform. This work requires prior administrative authorization from the ILO, as well as the intervention of the technical staff managing the ILO Quantitative Platform on Social Security. The result is the creation of a workspace, generally assigned to a group of users of a model in a social security institution or country.

Three types of users can be defined, depending on the rights of use assigned to them:

- **Administrators** have rights assigned in a specific ILO/HEALTH application to configure and modify all elements of the model, including the creation of new models and scenarios, and the backup of data outside the online platform.

- **Editors** have the right to edit all model data, including parameters, variables and other specific configurations at the scheme level, as well as to run the model and view and extract all results. Users with editing rights usually work on the actuarial platform daily.

- **Viewers** have limited rights to view all the information associated with the "workspace" where a specific application of the model exists. They are unable to modify contents.

The basic idea of distinguishing between three different types of users is to guarantee a secure working environment, in terms of confidentiality, protection of information (including the models and data developed and entered by users), and quality control of the process and results.

When a model is run, ILO/HEALTH automatically generates an extensive set of reports. The model runs are made in two blocks: The demographic block and financial block. Output users are also classified by the types listed above.

Output reports for financial and actuarial projections

This category of outputs includes a variety of reports that provide details on the intermediate and final calculations performed by the calculation tool. Users can move through the different output matrices to display the outputs of the calculation. To protect the integrity of output data, output reports cannot be edited within the tool; however, they can be exported to a csv or xlsx format for editing in MS Excel or other spreadsheet programmes. With each run of a new model scenario, the output matrices are reset and automatically replaced by new outputs.

Annex I provides a detailed list of the input and output variables and reports. Some of these are discussed in sections 5.4 and 6.5. In general, they contain the following:

- **Demographic projections**, by sex, age, population group and healthcare scheme. Including details for active and inactive contributors and beneficiary populations.
- **Detailed financial projections**. These include projected flows of salary mass, income and expenditures, and projected healthcare service expenditures (by type of expenditure). Where applicable, these projections are disaggregated by sex, age, population group and scheme.
- **Financial and demographic indicators**. The reports on indicators allow users to review the resulting values to assess if a specific model formulation is performing well according to expected logical results for the specific scheme under evaluation. It also allows them to provide a more detailed overview of the future development of different coverage schemes, among other parameters. Some calibration and consistency tests require the set of indicators generated by ILO/HEALTH.

ILO/HEALTH calculates a set of demographic and financial indicators:

Demographic Indicators	Financial Indicators
• Labour force coverage rate, total and by sex: active contributors / labour force • Population coverage rate, total and by sex: active contributors / working-age population • Average age of total active contributors, by sex • Average age of total insured population (including family dependants), by sex • Average age of new contributors, by sex • Age distribution of the population, in percentages and by age groups: total population, insured active contributors + family dependants, age groups 0-4, 5-14, 15-49, 50-64, 65+), sex, and year of projection	• Average insurable salary, total and by sex • Annual growth rate of the average insurable wage, total and by sex • Administrative expenditure at time t as a percentage of expenditure on healthcare benefits • Expenditure on healthcare and cash benefits as a percentage of GDP • Total expenditures (including administrative expenditures), as a percentage of GDP • Reserve ratio • Total healthcare expenditures, by population group and sex

Demographic Indicators	Financial Indicators
	• Percent of total healthcare expenditures of each healthcare package, by population group • Total expenditures as a percentage of GDP (includes healthcare, cash, administration) • Total expenditures as a percentage of government general expenditure (includes healthcare, cash, administration)
See section 6.5.4 for worksheets related to each of these demographic indicators.	See section 6.5.3 for worksheets related to each of these financial indicators.

Main demographic aggregates table

This table displays a set of year-by-year aggregated variables by sex and total, comprising the following: projection year, total population, employed labour force, active contributors, protected population referred to as the "insured population" (beneficiaries), residual insured population from past contributions and family dependants. It also includes the coverage rate of contributors as a percentage of the labour force and coverage rate of the total insured population as a percentage of the total population. Section 6.5 provides more details and instructions on these indicators.

Main financial aggregates table

This table contains a set of year-by-year aggregated variables classified by sex, as follows: projection year, salary mass, revenues (social contributions, government transfers, interest revenue and others), expenditure on benefits (total, healthcare benefits, cash benefits, administrative expenditures and others). A similar table contains values as a percentage of GDP. Section 6.5.1 provides more details and instructions on these indicators.

Expenditure table for healthcare benefits

This table provides a summary of healthcare expenditures classified by population group and healthcare package, as well as a consolidated sum of these indicators for all population groups.

4. Rationale behind ILO/HEALTH

This section is for:

- *Actuarial practitioners that will use ILO/HEALTH, including those entering data, consulting results and reports*
- *Any user wanting to learn about the different components of and rationale behind the calculations in the model*

In this section, users will learn about:

- *Definitions of coverage, population groups and financial flows*
- *Processes simulated in the actuarial platform*
- *Factors that affect demographic and financial flows*
- *How population groups and cash flows interact to yield demographic and financial projections*

4.1. Population groups and coverage

A population group in ILO/HEALTH consists of individuals who share similar:

- exposure to demographic and labour market characteristics for mortality, disability and retirement
- income behaviour
- family dependency structure, and
- access to and demand for healthcare services.

A population group in a contributory scheme contains the following insured groups:[7]

- **Insured active contributors.** People currently paying contributions that have already attained the right to claim healthcare and financial benefits from the scheme.
- **Insured inactive contributors.** People who no longer pay contributions but are still able to claim healthcare benefits generated by their past contributions. They will lose this protection if they do not begin contributing in the future.
- **Insured retirees.** People who stop working but who can claim healthcare benefits even if they do not keep paying contributions, as long as they are receiving pension benefits. This is because in many countries, pensioners in social security schemes are automatically covered by the health insurance system.

[7] The generic term "insured" is used as a synonym for protected person. As such , it does not mean that the scheme is necessarily based on a contributory insurance model.

- **Insured family members (covered dependants).** Family members of the abovementioned groups with rights to access healthcare benefits through the contributions of the principal insured contributor.[8]

Additionally, ILO/HEALTH contains the groups:

- **Uninsured active contributors.** People currently paying contributions that have not yet attained the right to claim healthcare and financial benefits from the scheme.
- **Uninsured family members.** Family members of uninsured active contributors who are not yet able to access health benefits through the contributions of the principal insured.

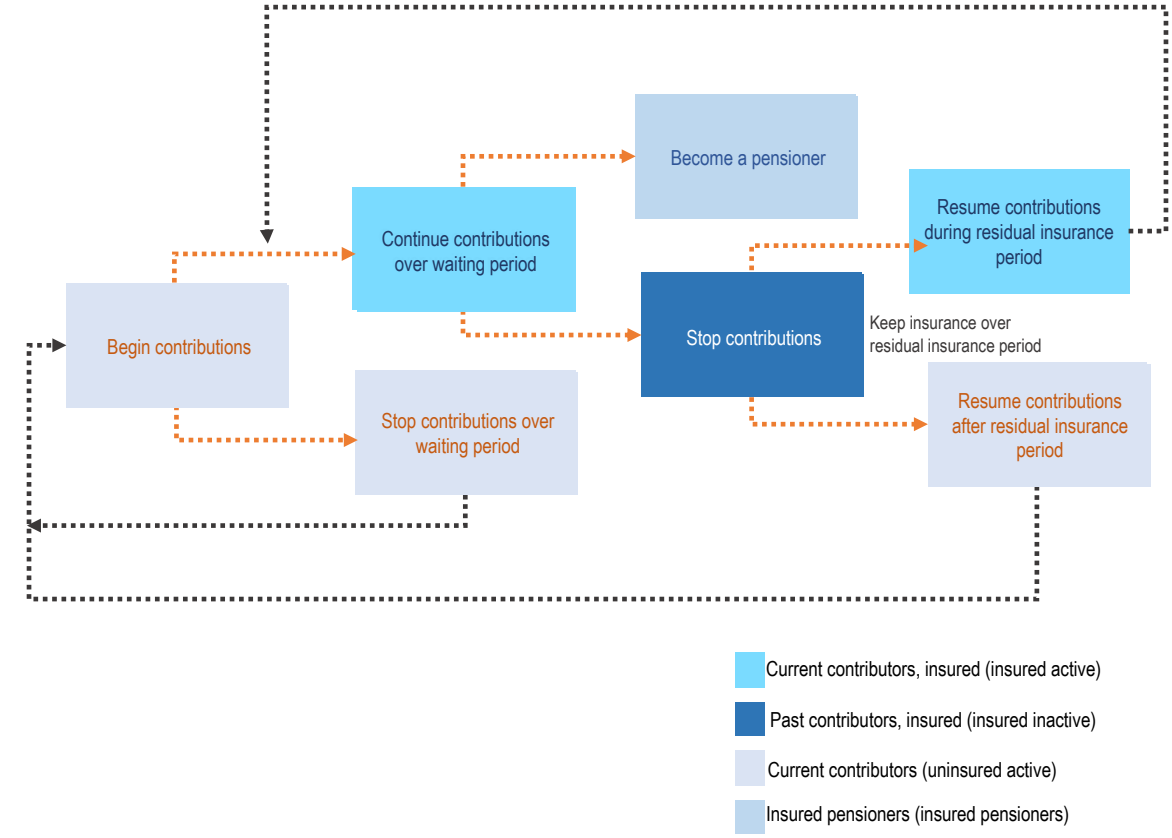
Timeline: From uninsured to insured active contributor status

All active members start by contributing. During the waiting period for the insurance, they are uninsured active contributors and remain so until they have completed the contributory waiting period. Once they complete the waiting period, they become insured active contributors. Their status is unchanged unless they stop contributing for a longer period than the residual insurance period (the time an insured member can keep this status without contributing). In such a case, the next time they reactivate contributions, they return to the beginning of the timeline. If they become pensioners, their insurance and contribution status remain unchanged for life. If, according to the rules of the scheme, some family members are covered by insurance for the duration that the contributing member is covered by insurance, the family's insurance coverage starts and ends with the contributor's coverage.

Note: Modelling for non-contributory schemes. In the case of a non-contributory scheme, the steps described above are simplified given that users only have to enter the coverage rates of the total population equivalent to the proportion of the population that is covered by the respective scheme, without worrying about modelling the variables and parameters associated with the contributions of insured contributors. In this case, 'insured person' includes all persons protected by the scheme.

[8] The principal insured are insured contributors from active, inactive and disability pensioners and retirees. They are the main members who are contributing or have contributed to the health insurance policy for themselves and/or other dependants (i.e., family members).

Figure 9 – Overview of the main functional processes and population groups

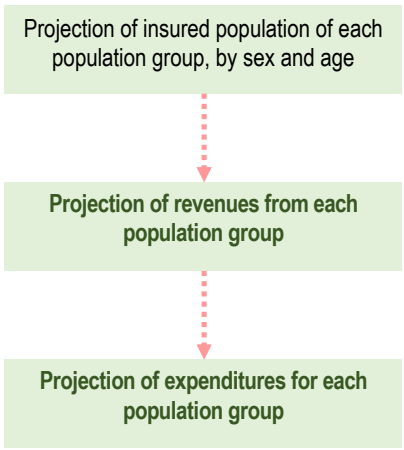


4.2. Projection of cash flows by population group

ILO/HEALTH has a three-step strategy for projecting cash flows of a given scheme:

1. Projection of the insured population of each population group by sex and age, understood as the total protected population for a given scheme.
2. Projection of the revenue from each population group, including government contributions for non-contributory schemes.
3. Projection of the expenditure for each population group.

Figure 10 – Projection of cash flows of a given health insurance scheme

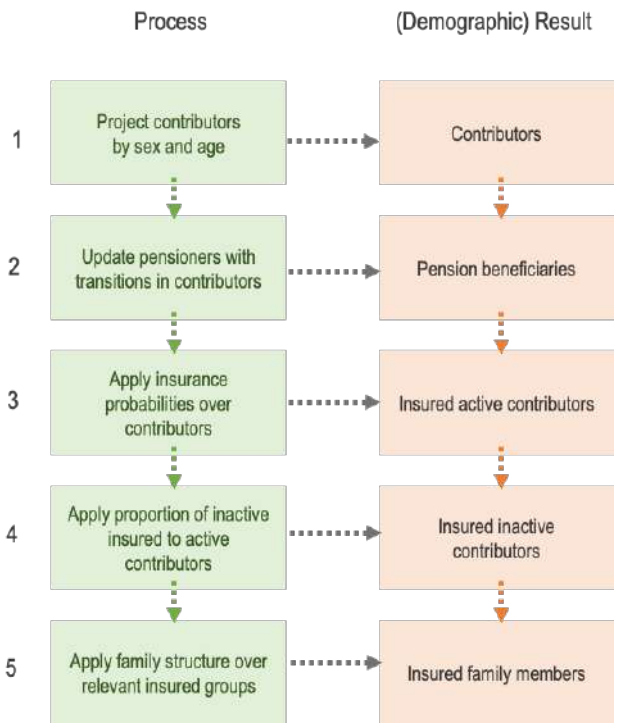


4.2.1. Projection of insured population of a given population group

ILO/HEALTH projects the insured population as follows:

- Projection of the active contributing population;
- Projection of the population protected by healthcare benefits;
- Subtraction of the uninsured active population;
- Estimation of the insured inactive population; and
- Estimation of the insured family members.

Figure 11 – Projection of insured population of a given group



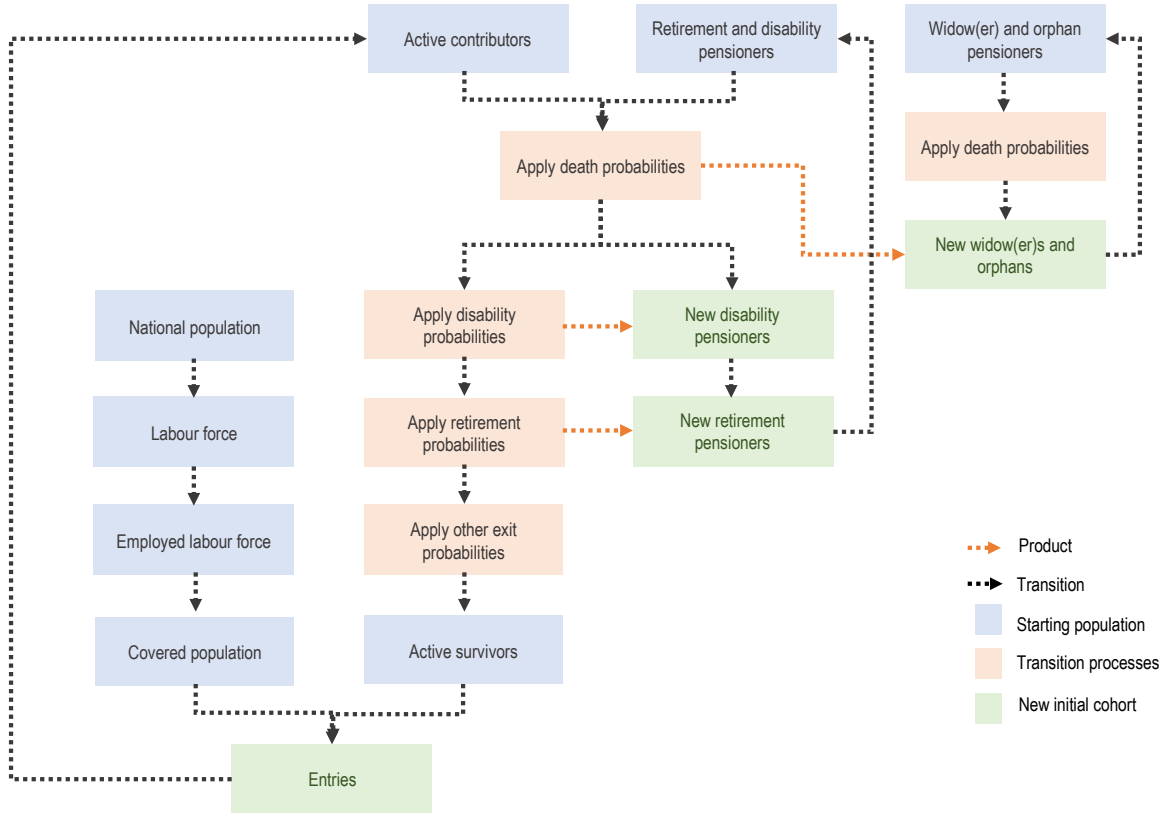
4.2.1.1. *Projection of contributing population*

The active contributing population and retired population are key for the whole process since the other groups are calculated based on the results from at least one of those two groups.

Both groups are estimated together in a model of cohorts that shares similarities with pension models, with some simplifications to facilitate data collection.

An initial cohort of the contributing population (the number of people of the group of the same sex and age) is exposed to exit probabilities: death, retirement, disability and other exits (probabilities defined by sex and age). The total surviving population of the cohort is compared to the expected contributively covered population, and the difference between the two corresponds to the number of entries. These entries are distributed by age according to a given distribution. Finally, survivors are added to the entries to become a new initial cohort.

Figure 12 – Projection of contributing population



4.2.1.2. *Projection of pensioners*

In many countries, pensioners from social security systems have access to healthcare protection. Pensioners are estimated by adding the people who transition from the active contributors' group through disability and retirement to the retirement and disability survivors from previous periods. This becomes the population of retirement and disability pensioners. The deaths of active contributors and pensioners are used to estimate new widows and orphans that will join the surviving widow(er)s and orphans from previous periods.

4.2.1.3. *Active and inactive contributors*

Once the active contributing population is projected for each year, users enter the expected percentage of the active population covered by insurance provisions (probability of being an insured active contributor) for each age and sex. In other words, insured active contributors have the right to claim benefits in case of need, although services are not necessarily used.[9] This probability is complemented by the probability of contributing without a right to benefits (probability of being an uninsured active contributor).

[9] Normally, the probability of being covered in the case of active contributors during the year corresponds to the probability that their contributions meet the requirements for accessing services according to the rules of the scheme. This probability can be estimated based on observations, assumptions or a combination of both. Probability changes by age and sex, as does contributing behaviour.

ILO/HEALTH makes a similar adjustment to estimate the proportion of the insured inactive population as compared to the insured active contributors (this is a comparison, given that insured inactive population is not part of the insured active population).[10]

Finally, ILO/HEALTH calculates the insured contributors from active, inactive, disability and retiree groups (i.e., the main insured groups) using a family structure matrix to estimate the number and age of their family dependants with rights to healthcare services.

4.2.2. Income streams

ILO/HEALTH considers the following five sources of income (not all of them always apply):

1. Contribution income (employers and/or workers).
2. Government transfers.
3. Interest from the investment of the reserve.
4. Co-payments. In some cases, while healthcare service providers receive co-payments, these are not necessarily a source of scheme income. In some healthcare schemes, co-payments are referred to as "cost recovery charges", particularly when the healthcare facilities are owned by the scheme administrator.
5. Other revenues.

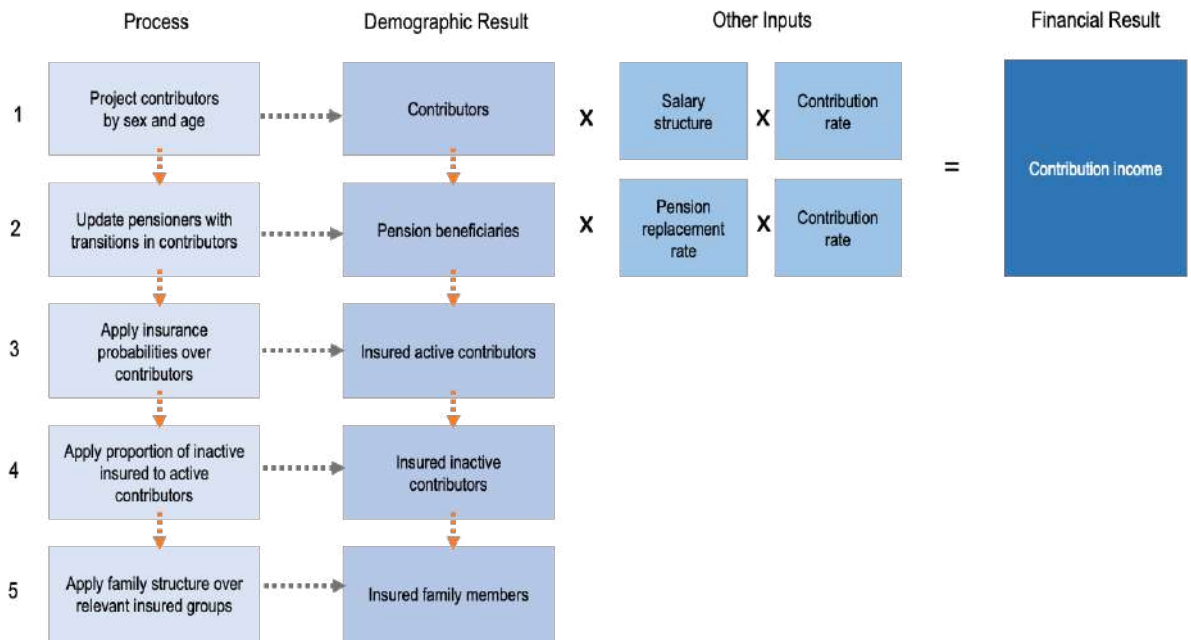
There are two income streams typically related to population groups: the contribution income associated with active contributors (regardless of their insurance situation) and the co-payments some insured population groups pay to access healthcare services. Some healthcare schemes have their own facilities to deliver healthcare care and charge utilization fees to recover a proportion of the costs.

The contributions typical of a contributory scheme are related to a source of income. Often, they are also proportional to this income. The first step in the process of estimating contributions is to estimate contributable income. The contributable income is the weighted average between two series: the adjusted past contributable income and the theoretical income (salary curve) weighted according to the presence of surviving contributors and entries in an age group.

Apart from contributions, ILO/HEALTH allows for the inclusion of revenues from direct government transfers to co-finance expenditures. It models each population group by defining a sequence of absolute amounts over time. Users should estimate these amounts outside the model and then enter them.

[10] The insured inactive population is a portion of the inactive population, more specifically of the recently inactivate population of a population group, which is not calculated in the model given that the definition of this population varies by country, which complicates the model more complex without significantly contributing to the precision of the calculations.

Figure 13 – Income streams, contribution income



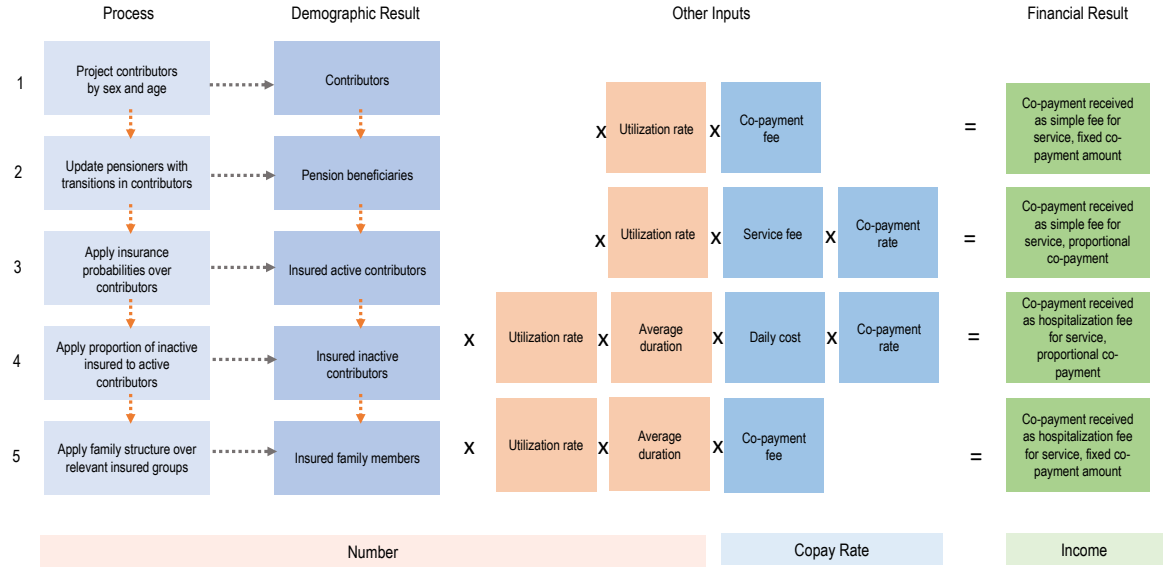
Co-payments are normally calculated after calculating expenditures. There are two co-payment methods, each of which require a different calculation method. First, a fixed co-payment amount (absolute value) per healthcare intervention means that each time a given healthcare intervention is provided, the scheme bills users a certain pre-established amount. Once that amount is established, it is assumed to be independent of the intervention cost.[11] In this case, the co-payment income (or expenditure) equals the number of interventions multiplied by the established amount. Second, a proportional co-payment means that the co-payment is a given proportion of the cost of each healthcare intervention, so the co-payment income (or expenditure) corresponds to the total cost of the health intervention multiplied by the proportion billed as a co-payment.

Note on co-payments in ILO/HEALTH: In many cases, co-payments are not part of the insurer's revenues; however, for the purpose of making them transparent in the model, they are included as part of the revenues. If ILO/HEALTH users are not interested in incorporating co-payments into a specific model or scheme, they should simply consider the fees for the affected healthcare interventions minus co-payments.

Besides these income streams related to population groups, the Other Income component corresponds to a budget allocation or fixed income unrelated to the active contributions or the healthcare services provided. It is entered into the model as a sequence of absolute amounts over time.

[11] This is an assumption, while we know very well that the cost of the healthcare intervention is a factor in the determination of the amount.

Figure 14 – All income streams



4.2.3. Projection of expenditures

There are four expenditure categories in ILO/HEALTH, each with different expenditure subcategories: Healthcare service expenditure, financial benefits expenditure, administrative expenditure and other expenditure.

Healthcare service expenditure is usually the most important as ILO/HEALTH is a tool specifically for health scheme modelling. Healthcare service expenditures have three payment methods, some with different modelling options that are applied to all the healthcare interventions of a package: (a) budgetary allocation is when a certain package is assigned a given expenditure amount (defined outside of the model), regardless of demand for healthcare or actually limiting the demand that can be satisfied (i.e., healthcare facilities receive a set budget that does not depend on the population served or the volume of services provided); (b) capitation, when expenditure on a healthcare package is a given amount per protected individual regardless of how often individuals in any group use the services (i.e., healthcare providers receive a set amount per person they are meant to serve; what they receive depends on the volume of the population that can access services on their premises); and (c) healthcare intervention payment corresponds to the payment of a fee (or the allocation of some resources) linked to healthcare interventions. Through this third option, ILO/HEALTH can handle two types of payment methods: fee-for-service (a payment for each time an individual receives a healthcare intervention in the package) or case-based payment (e.g., diagnosis-related group (DRG) or similar classification used to classify healthcare interventions comprising casemix-based funding).

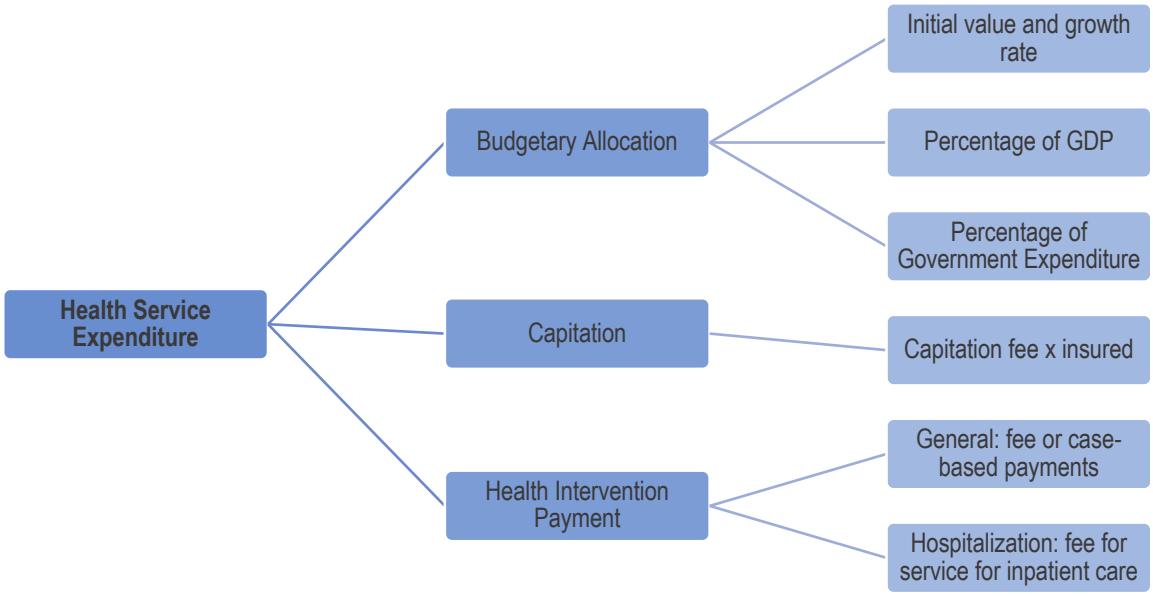
Budgetary allocation has three different costing alternatives for modelling: (i) initial value and growth rate; (ii) percentage of GDP; and (iii) percentage of total government expenditure. In the first option, users input the initial value and the expected growth rate of this initial value over the projection period, so the value of the allocation is calculated based on the previous allocation. For

the option based on percentage of GDP, users input the percentage of GDP allocated for the service over time and the model estimates using the projected GDP. Percentage of government expenditure is similar except that users input government expenditure instead of percentage of GDP.

Capitation can only be modelled by entering the capitation fee (which can change depending on the age of the insured). This is applied for each insured group to obtain the total cost.

Finally, there are two types of healthcare intervention payments: (i) a general one, and (ii) hospitalization (or inpatient). Under the general modality, users input the expected utilization rate for the healthcare services and the expected costs of those services, either as "fee-for-service" payments or "case-based" funding, including DRG or a similar casemix-based funding. Three factors affect the calculation of the hospitalization modality: frequency of inpatient utilization, corresponding to the probability of becoming an inpatient case (being admitted to the hospital), expected number of inpatient care days once hospitalized, and the cost per hospital day. Both modalities are adjusted by a performance factor consisting of potential fines or premiums given to healthcare providers for poor or outstanding performance, respectively.

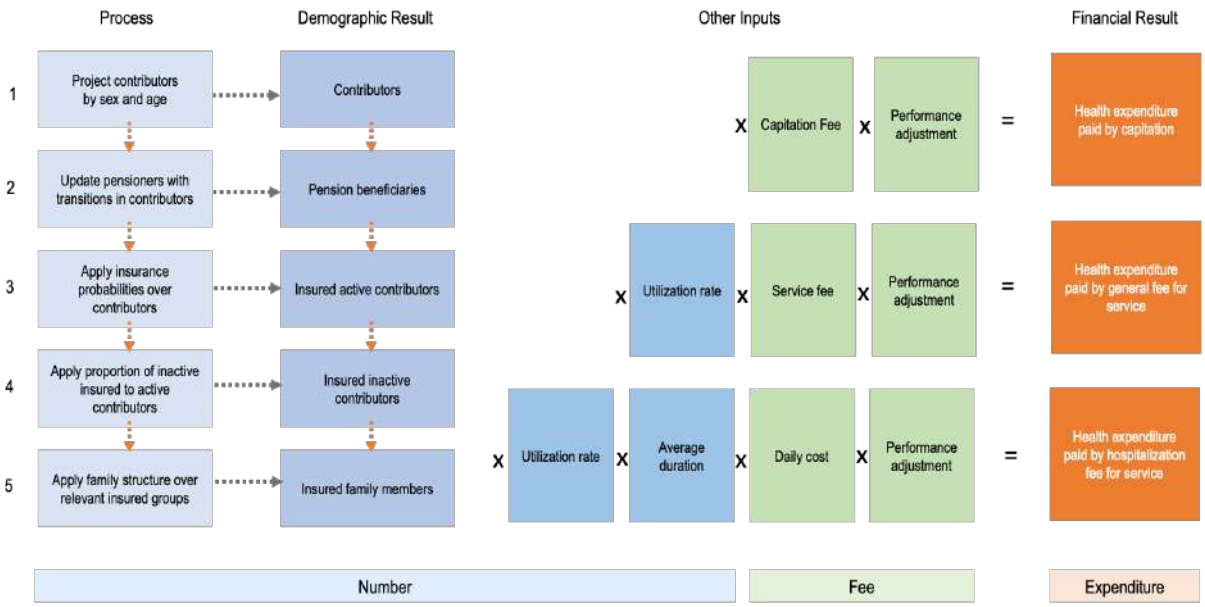
Figure 15 – Healthcare service expenditure



Performance-based payments factor. This factor is included in ILO/HEALTH to handle expenditures associated with payments to healthcare providers based on their performance. Payment methods often include specific incentives and metrics to promote quality and other healthcare system performance objectives. Performance-based payments are calculated in the model as a proportion of annual healthcare expenditures (those linked to the healthcare packages). Therefore, users can modify performance-based

payments in each healthcare package. A performance expenditure is also a healthcare expenditure, for which reason the model includes it in the healthcare package expenditure.

Figure 16 – Expenditure streams



4.2.4. Financial benefits

The model considers three pre-determined financial benefits: (a) sickness benefit; b) maternity benefit; and (c) funeral allowance. Additionally, the tool has a generic financial benefit that can be modelled for any financial benefit not included in the predetermined list.

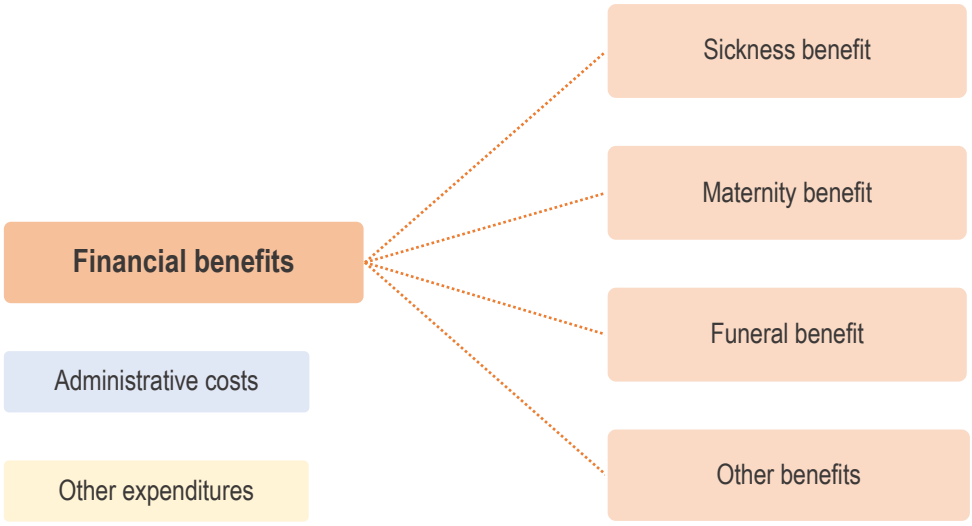
Sickness and maternity leave benefits are calculated as a replacement rate factor over the insured salaries. Additionally, maximum and minimum values for the amounts received per period of sickness or leave are included.

The funeral benefit is a fixed amount provided for each deceased individual in a population group covered by the benefit.

Finally, the generic financial benefit is calculated in the model as the sum of a replacement rate over the salary (with minimum and maximum values) and a fixed amount. All parts may have a value of zero if desired.

In addition to benefit payments, ILO/HEALTH models administrative costs as a given proportion of the benefit expenditure. Finally, users input other expenditure amount into the model.

Figure 17 – Financial benefits



The different cash flows from population groups are added to create a scheme's consolidated cash flow.

5. Working in ILO/HEALTH

This section is for:

- *Any user that will use ILO/HEALTH, including those entering data, consulting results and reports*

In this section, users will learn:

- *How ILO/HEALTH looks and works*
- *How to enter ILO/HEALTH as a first-time user*
- *How to set up a model*
- *How to create and manipulate scenarios within a model*
- *How to manipulate matrices within a scenario*

5.1. Logging in to ILO/HEALTH

Most users will be familiar with the login protocol of ILO/HEALTH. The combination of email and personal password is common in most online platforms. Options to recover or change the password are available.

ILO/HEALTH requires users to have access to their email for certain communications, hence it is recommended that users provide an email address they can access when the model is being used.

Box. Types of users

ILO/HEALTH makes provisions for three kinds of users: Reader, Editor and Global Administrator.

A **Reader** can see the parameters of models, read and export the input and output matrices of all available scenarios.

An **Editor** can do everything the Reader can, as well as create new models and scenarios. The Editor can edit the matrices in any scenario and run scenario calculations. Most of this manual focuses on Editors. Useful parts for Readers are also highlighted. Notwithstanding, Readers should try to gain an understanding of the functions since they may become Editors for other projects.

A **Global Administrator** can do everything the Editor can. The Global Administrator also has administrative functions. They can add, modify and eliminate users, including other Global Administrators. The functionalities that are exclusively for Global Administrators are listed in another document.

5.1.1. First-time users

Once an administrator registers a new user, the user will receive an email containing the link to ILO/HEALTH and a provisional password. The first time users visit this page, they should enter their email address and select the "Change password" option. Users should **not enter the password emailed to them**.

On the Change Password screen, users should enter the email address used to register in the email field, the password the Global Administrator sent to them as "current password", and the new password chosen (the stronger the password, the better). Then, after retyping the new password to confirm it, users should save changes.

Once the password is changed, users can enter the ILO/HEALTH website with the chosen password as long as the administrator allows it.

In ILO/HEALTH, the provisional password will be valid only for the first session, meaning that users will not be able to log in a second time unless the administrator resets the password.

5.2. Models

In ILO/HEALTH, a model is at a higher level than a scenario. Any change to a model does not affect any other model in ILO/HEALTH. Within a model, users can create scenarios, which while independent from one another, are all limited by the rules of the model. Using the same model with different scenarios facilitates their comparison[12] and their capacity for sharing information.

[12] This does not mean that scenarios from different models are not comparable, only that it is easier to compare scenarios from the same model.

ILO/HEALTH stores and processes information at the scenario level: this means that a model cannot run on its own but rather through a scenario.

Model rules define key aspects of the scenarios: their size and calculation path (projection years).

Size of a scenario refers to the number and size of its matrices. This includes the number of dimensions in some matrices.

In the model definition, the following attributes determine the size of the scenarios:[13]

- number of schemes
- number of population groups
- initial and final projection year for the calculations
- maximum lifespan allowed in the calculations
- access to healthcare packages of members of different population groups, and
- number of years of historical data to report.

The calculation path corresponds to a set of equations or other information according to some attributes. In the model definition, users determine the calculation path by choosing whether the model reports nominal or real figures, and whether it does so by using real or nominal parameters.[14]

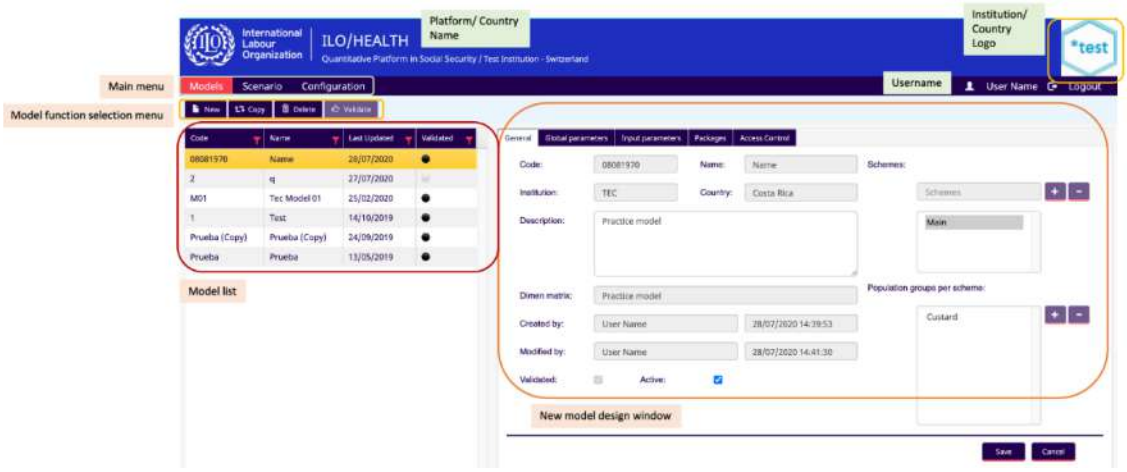
5.2.1. Exploring a model

In a context where previous quantitative exercises were performed, newcomers to ILO/HEALTH should explore the model definition of a previous exercise before editing scenarios or creating a new model.

After choosing Models in the main menu, three sections appear: the Models menu consisting of four tabs, a list of all available models (models added by any user) in the system and the Model window that shows the details of the highlighted model.

[13] The list is ordered according to the potential impact each item may have on the size of the model.

[14] In a multi-scheme model, users can easily include schemes both with and without an inflation-adjusted reference salary.

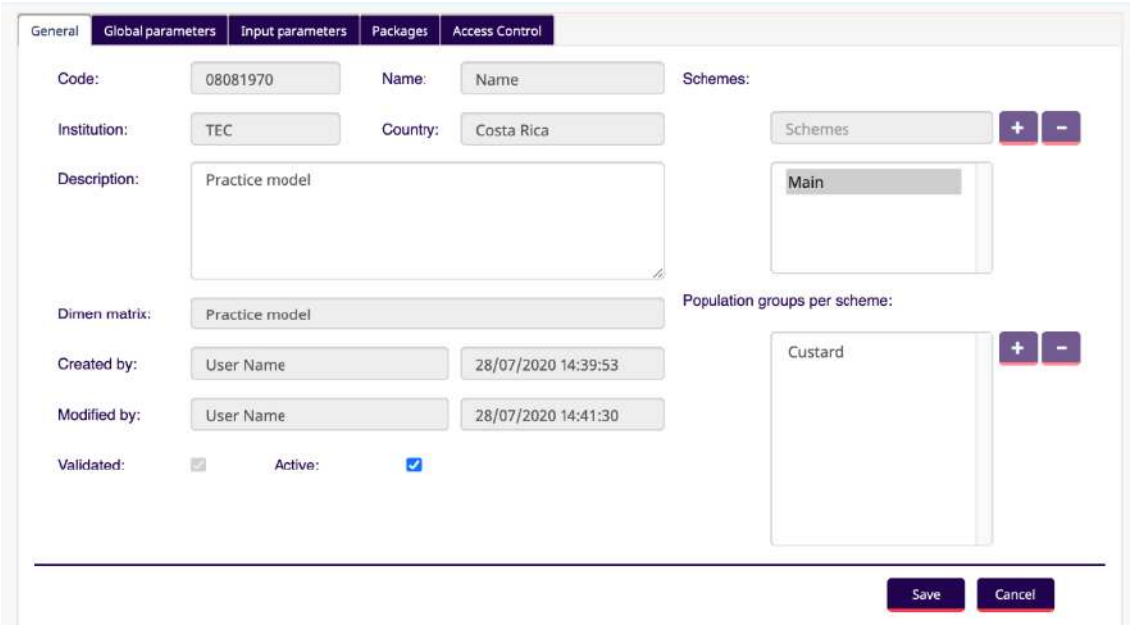


The list has a set of columns: Code, Name, Last Updated (date format) and Validated (checkbox). Users can easily sort the list by any column and filter the list by any of the fields (the only filter available is to check if the field contains a set of characters).

Code	Name	Last Updated	Validated
08081970	Name	28/07/2020	●
2	q	27/07/2020	
M01	Tec Model 01	25/02/2020	●

By selecting a model from the list, users can access the description of the selected model in the Model window to view two pages accessible by tabs: General and Input Parameters.

The General tab contains information on the basic attributes of a specific model:



- the code used for creation;[15]
- the name used to create the model;
- the institution being modelled;
- the country (automatically entered into the system) given that ILO/HEALTH is created to work in only one country;
- model description, including the rationale behind the model creation, the specifics that make the model unique and necessary and all other information considered important for potential future users;
- creator of the model (date and time of creation);
- last modification of the model (by whom and when);
- the names of the schemes included in the model (see section 6 for more information);
- the names of the population groups covered by the selected scheme model (see section 5.6.1 for more information);
- validation status (checkbox); and
- active status (checkbox).

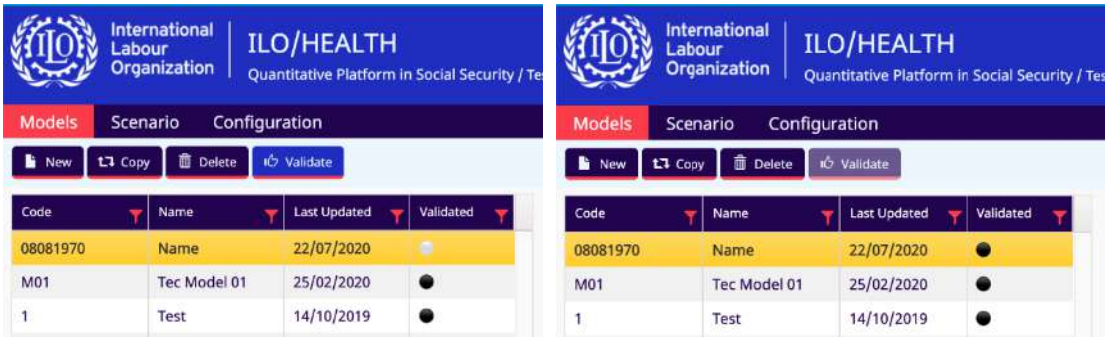
[15] The nomenclature for the definition of model and scenario codes is a decision for the final users. It is a good practice to keep a consistent code nomenclature that allows users to navigate through multiple models and scenarios.

Scheme names should be different, as should the names for different population groups belonging to the same scheme. Population groups belonging to different schemes can have the same name.[16]

The decision on the number of schemes and their population groups has a direct impact on the size of the scenarios. Scenarios created under a model will have a full set of matrices (input and output) for each scheme listed in the General tab. Many of these matrices will have a population group dimension (i.e., they will have a population group selection menu) and most will have a sex dimension. It is always important to weigh the increased precision achieved by expanding the model against the data management complications inherent in increasing model size.

Section 6.1.3 offers an example of how to fill in these parameters when setting up a model.

Users can validate a model when the full set of parameters in entered by selecting Validate in the Models menu.

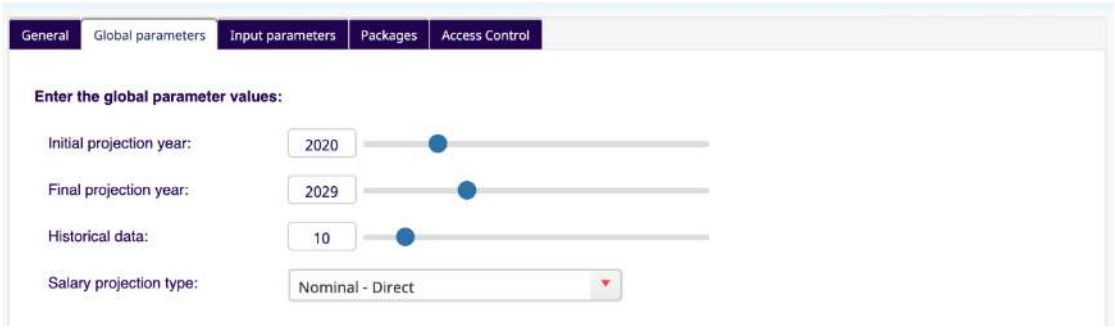


A model is active when scenarios of the model exist. If no scenarios exist under a model, the model is inactive.

The Global parameters tab has more detailed information on the parameters defining each scheme listed in the General tab. Here users can define:

- Initial and final projection year;
- Number of years of historic information to collect; and
- Real or nominal reporting:
    - Indirect or direct calculation of the reporting method (i.e., direct reporting receives all data in real terms and reports in real terms as well). Indirect reporting receives inputs in nominal values and estimates outputs in real terms.

[16] The system will not assume that these groups correspond to the same population. If they are the same population, the demographic matrices will need to be filled in each time.



The Input parameters tab has more detailed information about the parameters defining each scheme in the General tab. The customizable parameters for each scheme are:

- **Lifespan:** Maximum age attainable in the calculations;
- **Lower limit for contributing age:** earliest age people can legally contribute; and
- **Upper limit for contributing age:** maximum age people are assumed to contribute.[17]

Section 6.1.3 offers an example of how to fill in these parameters when setting up a scenario.

The Packages tab is crucial for understanding a model. Here, access to different packages is set up for each population group, meaning that the model reports that people of given ages in the scheme will have access to the healthcare interventions included in the package and that these interventions will be paid according to the package payment method. The configuration stage of the model offers a selection of packages to choose from.

The last parameter of the list guides the calculation flow in the system to calculate whether the reference salary used to calculate benefits has been adjusted for inflation.

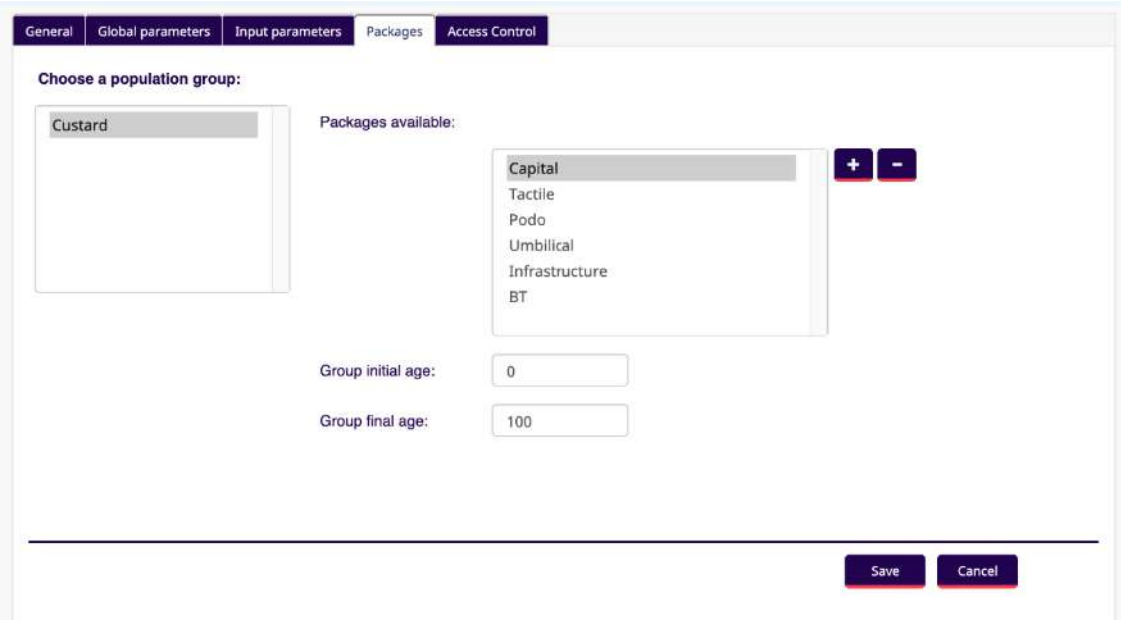
The other parameters directly affect the size of the matrices in the scenarios, for example:

- **The length of the projection period** increases the number of intermediate results and the number of input parameters.

[17] Normally, people can contribute up to any age. Defining the upper age limit for contributions depends on data availability for statistical inference. Older ages have less evidence in terms of salary, exit and even retirement behaviour while inferences from smaller samples have less credibility.

- **The lifespan** directly affects the size of the life tables to be entered as the dimensions of output matrices regarding pension beneficiaries. The size of the contributory age gap similarly affects the matrices related to contributing populations.

Coherence between the parameters and matrix size can be easily checked by exploring a scenario from an existing model.



5.2.1.1. *Scheme*

A scheme is a specific component of the social health protection system whose members share the same set of rules for obtaining healthcare and healthcare-related cash benefits. Accordingly, the definition of a scheme goes is in accordance with the rules and laws related to that scheme.

5.2.1.2. *Population group*

A population group is a set of people that have statistically different and identifiable attributes that differentiate them from the rest of the population in at least one characteristic that affects their potential access to healthcare benefits under the rules of the scheme.[18]

Statistically-different attributes that may be used to set up a population group include:

- death or disability probabilities;
- exit behaviour;
- entry distribution by age;
- retirement behaviour;

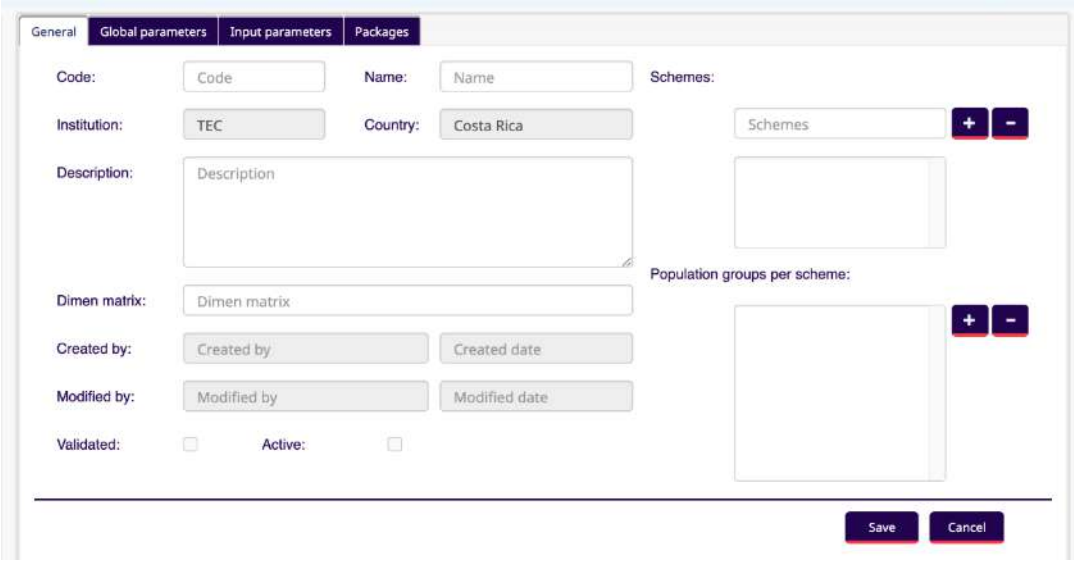
[18] The rules are not different; rather it is the interaction with the rules that differs.

- coverage potential;
- family structures;
- salary structure by age;
- expected growth of salaries; and
- demand for specific healthcare interventions.

5.2.2. Setting up a model

Users can set up a new model in ILO/HEALTH, especially if there are no existing models or if no existing ones can be adapted to user needs.

Users can access a blank form by selecting New in the Models menu. After filling in the boxes for Code, Name and Institution, providing a description, and adding at least one scheme and at least one population group for each scheme added, users can save the new model.

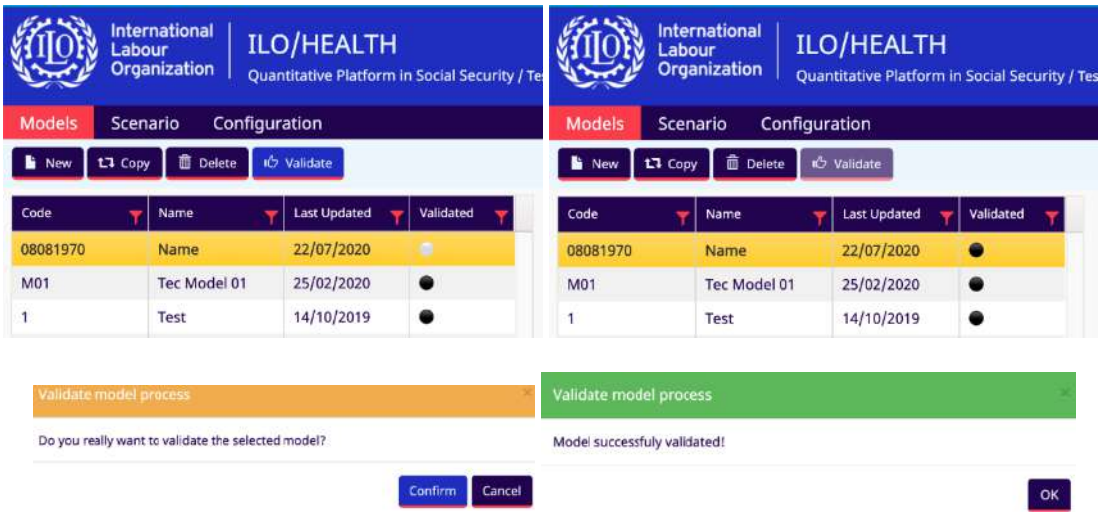


TIP: The proper documentation of a model and its scenarios extremely important because it informs different users of a particular model about the specific features of that model and its scenarios. Users should include a detailed but concise description of the model in the Description field. Future first-time users of the model and those responsible for producing actuarial reports will appreciate this effort.

When users select Save, the model will be added to the list of models. Users can then enter quantitative parameters in the General and Input parameters tabs. They should then save the desired changes. Finally, users can allocate the packages to population groups using the Packages tab. Users can modify the model as long as the specific model has not been validated.

See section 6.1.3 offers an example of how to fill in these parameters when setting up a model.

To validate the model, save the changes and select Validate in the Models menu.



The validation process takes a few seconds as it verifies the basic coherence of the model's dimensions. This includes checking to avoid a final projection year that is earlier than the initial projection year, or a final age for activity or contributing age that is higher than the possible lifespan.

Once the model is validated, users can create scenarios with the model, thus activating the model. The validated model cannot be changed. If users discover that the model does not meet their needs, they can make a copy of the model, make the required changes to the copy and delete the previous one.

The initial formulation of a model requires adequate planning. The model setup is pivotal to the success of any projection exercise. Failing to choose the right schemes, population groups, time and age dimensions and calculation methods can potentially increase the workload for users and their teams.[19] It can even lead to improper designs that will ultimately fail to achieve the desired objective of the model formulation. Therefore, users should discuss the matter with their teams (and explore the empty matrices) before filling in matrices. They should also discuss the model with users of the results outside the actuarial team.

> **TIP:** Users should take their time setting up the model. They should thoroughly discuss the conditions under which a particular model will be defined in ILO/HEALTH with their teams and analyse how the conditions will affect future policy scenario modelling work, as well as practical applications. They should focus on the availability of specific data; for example, if different population groups are being modelled, each group requires separate data: contributory livelihoods and past credit, biometrics and income parameters, among others. The legal framework and international ILO standards on social security adopted by the country should also be considered.

5.2.3. Copying a model

Users can make a copy of any validated/non-validated, active/inactive model by selecting Copy in the Models menu.

A copy is a non-validated model with the same parameters of the original model (except for the word *Copy* added to the Code and Name), which can be modified prior to validation. This is especially useful for modifying some parameters of elaborate models that would otherwise take

[19] The parameters shown by default in the Input parameters tab of the Model window are only placeholders and should not be viewed as recommendations of any kind.

many hours to set up from scratch. One routine copy procedure would be the modification of the projection period for an existing model when it is time for a new application.

5.2.4. Deleting a model

The Delete function in the Models menu allows users to delete a model from the list. This reduces the list of models available, helping to reduce redundancy and noise.

> **TIP:** To ensure transparency and comply with good actuarial practice (see the *ISSA-ILO Actuarial Guidelines*), users should consider retaining in the web application an inactive version of the models that have been used to support technical studies or actuarial valuations conducted and that support official technical reports. An external data backup, properly administered, is also advisable. See section 5.3.5 Exporting a full scenario.

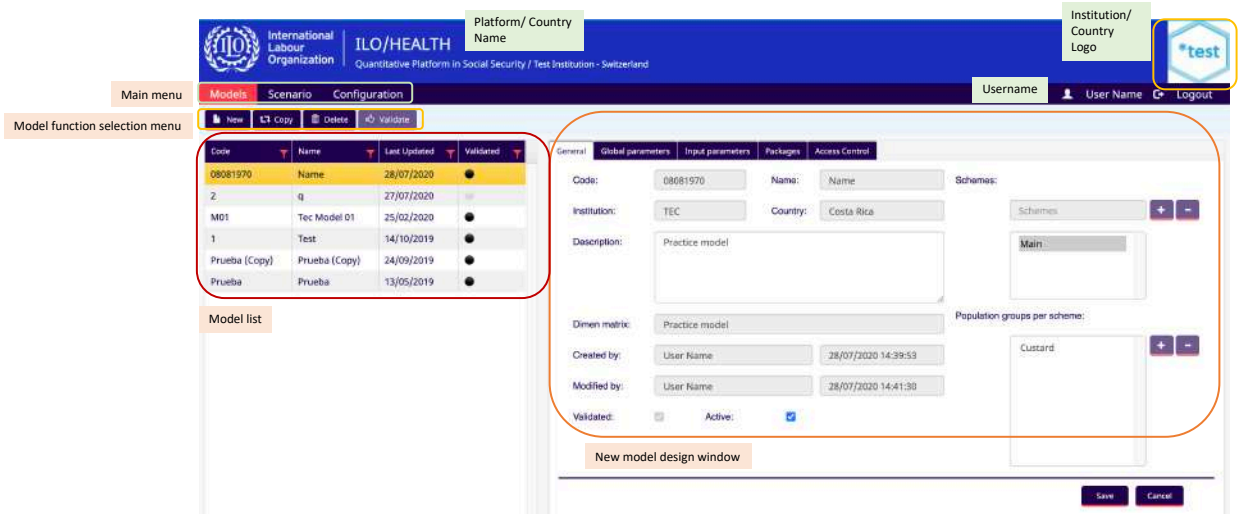
Deleting a model ensures that no new scenarios of the model are possible. ILO/HEALTH only allows the deletion of models that are in "inactive" status. If users need to delete an active model, they first need to delete all scenarios of the model in question (to make the model inactive) before deleting it. This is a safety feature to avoid losing the attributes of models that support useful scenarios. Also, users may require additional scenarios from past models.

5.3. Scenarios

A scenario is one instance of a model. The scenario contains a set of matrices, which interact among themselves according to the constraints of the model and the procedures set up in ILO/HEALTH. The matrices in the scenario store the inputs and assumptions for the calculations, as well as the outputs of the calculations if the scenario were run.

Users can explore, create, copy, run, delete, export and manipulate their matrices. Section 5.5.3 discusses matrix manipulation.

After selecting Scenarios in the main menu, three sections appear: the Scenario menu consisting of seven tabs, the list of Scenarios and the Scenario window.



The list of scenarios has four fields: Code, Name, Last Updated and Calculated (checkbox) as its counterpart for models. The list can be filtered and sorted. By default, all scenarios are grouped by their model, and the Sort command sorts the scenarios within each model by field.[20]

The Scenario window shows details of the highlighted scenario on the list: the model used, the code, name and description, who created it and when, the last person that modified it, and if and when the scenario was calculated. The code, name and description may be modified by an editor at any time after selecting the respective box to make and save changes.[21]

Section 6.1.4 offers an example of how to fill in these parameters when setting up a scenario.

[20] The default clusters are sorted according to modification date of the scenarios. The most recently modified scenarios are listed first.

[21] A good institutional practice is to develop a consistent naming system to assign the code and name of the scenarios to enable all editors on the actuarial team to understand the date of creation and other details of each scenario they are editing and running.

5.3.1. Opening an existing scenario

Selecting a Scenario from the list and using the Open function in the Scenario menu shows the details of the selected scenario.

The scenario detail has two parts: the navigation tree of matrices, where folders of matrices allow users to navigate scenario information, and the Matrix window with the Matrix menu and matrix contents. Section 6.2 explains how to open a scenario and explore its matrices.

5.3.2. Creating a new scenario

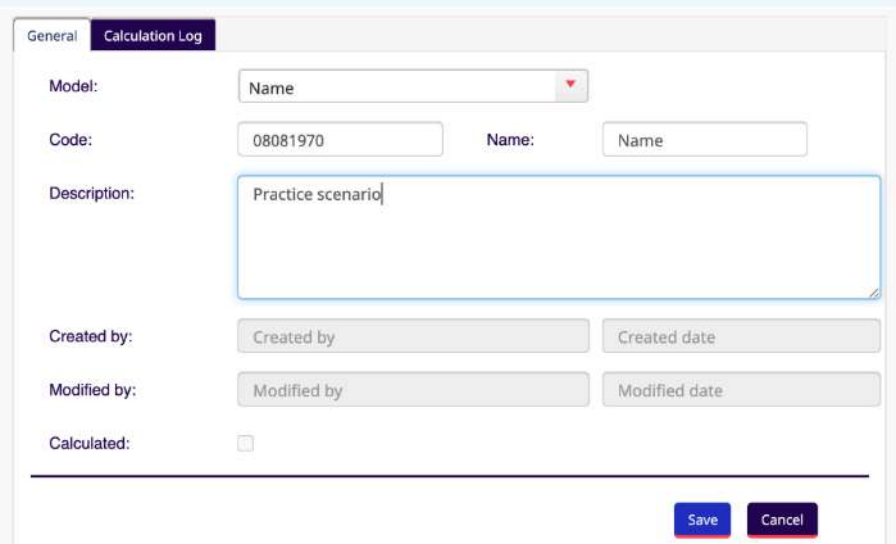
Users should select New in the Scenario menu to open a blank form.

Users can then choose the model for which their new scenarios will be an instance. They may choose from among the full list of validated models (shown by name).

Users must then add the Code, Name and Description.

After users select Save for the first time, ILO/HEALTH proceeds to create a new scenario. This process occurs in the ILO/HEALTH server and can take some time. Users will receive a notification within ILO/HEALTH informing them that the process has begun. They will also receive an email when the scenario has been created. They can perform other tasks within or outside of ILO/HEALTH while the scenario is being created.

A new scenario created through this process is a blank scenario without any information in the input and output matrices.

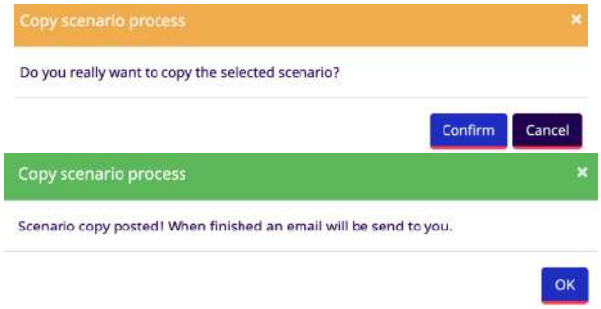


5.3.3. Copying a scenario

Often, the information from an existing scenario can serve as the base for the creation of another scenario of the same model. This is especially true when performing stress tests, sensitivity tests and best- and worst-case scenarios that accompany base scenarios in reports.

While ILO/HEALTH provides easy ways to quickly complete the matrices within a scenario, the easiest procedure is often to copy an existing scenario and later modify the matrices that need changing.

To do this, users should select Copy from the Scenario menu. As this will again create a full set of matrices in the server, ILO/HEALTH will notify users by email when the process begins and ends. The time needed depends in the size of the scenarios (number of projections years, number of schemes, number of population groups, etc.).



Once the process is completed, the new scenario will be included in the lists with the word (Copy) added to the code and name of the original scenario. Users can change code and name as desired and save those changes.

The scenario created through this process will contain the same matrix information as the original one. At this point, users can edit and define the new scenario as needed.

5.3.4. Running a scenario

ILO/HEALTH run scenarios through its server. The calculations are done in a remote location. During a scenario calculation, the scenario currently running is locked from further changes, but users can work on different scenarios. Sections 6.2.4 and 6.4 provide examples of this process.

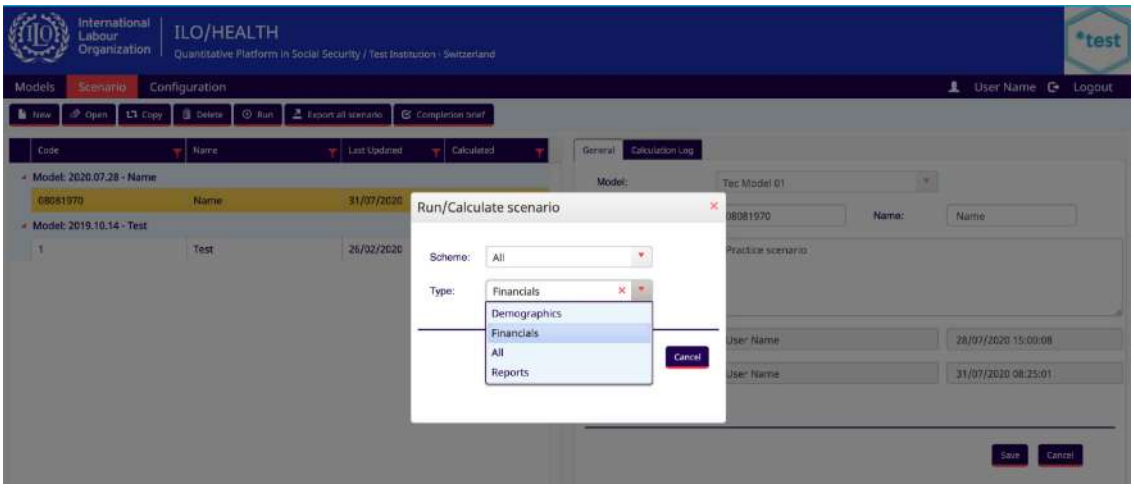
A scenario can be run by selecting Run in the Scenario menu. ILO/HEALTH will show the Run Scenarios message box, where users can choose among three options:

- Running the Demographic Projections
- Running the Financial Projections
- Running both Demographic and Financial Projections

A demographic projection calculates active contributors, pensions (retirement, disability, widow(er)s and orphans), beneficiaries by age, sex and projection year. Crucially, it also estimates the total number of potential users of healthcare and healthcare-related cash benefits per year. See section 6.5.2 for more details.

A financial projection calculates salaries and pensions by age, sex and year, the cash flows related to providing healthcare services, the payment of cash benefits and recovery of co-payments, the full set of financial indicators and financial reports are listed in section 6.5.3. The process will

generate an error message if users attempt to run the financial projection before the demographic projection.



The running process can take some time, especially for complex scenarios. ILO/HEALTH will send users an email when the process has ended and inform them whether it was successful. In a few cases, the email will report an error caused by missing information or a mistake in the inputs.

5.3.5. Exporting a full scenario

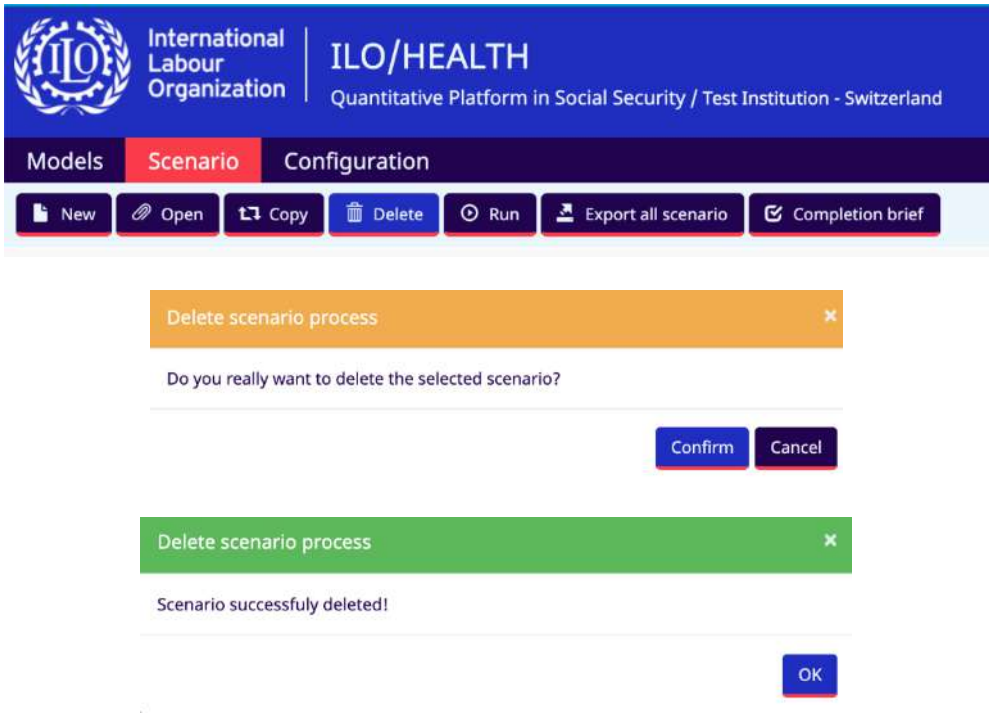
By selecting Export all scenario in the Scenario menu, users instruct ILO/HEALTH to create a copy of all matrices that belong to the scenario in an Excel-friendly format (csv).

The process will occur in the remote location (server). The email informing users that the process has been completed contains a link to download a zip file with all the matrices.

The zip file exists in the server for a limited time (about 24 hours). This maintains the server memory for performing all required tasks. The link works for everyone, so users can share it with their teams.

5.3.6. Deleting a scenario

Users with editing rights can select a scenario and then Delete in the Scenario menu. As for other requests, ILO/HEALTH will require a confirmation from users about the action.[22] Once the action is confirmed, the scenario will disappear from the server and all data will be lost.



Scenarios not being used for analysis should be deleted to avoid redundancy and maintain a clean workspace. However, as deleted scenarios cannot be recovered, **it is crucial that users discuss permanent decisions such as deletion** with the team.

> **TIP:** Make local backups of scenarios that are considered important for historical and administrative purposes, for example, those that support official actuarial reporting calculations. Carefully documenting each model and its scenarios is crucial.

5.3.7. Completion brief

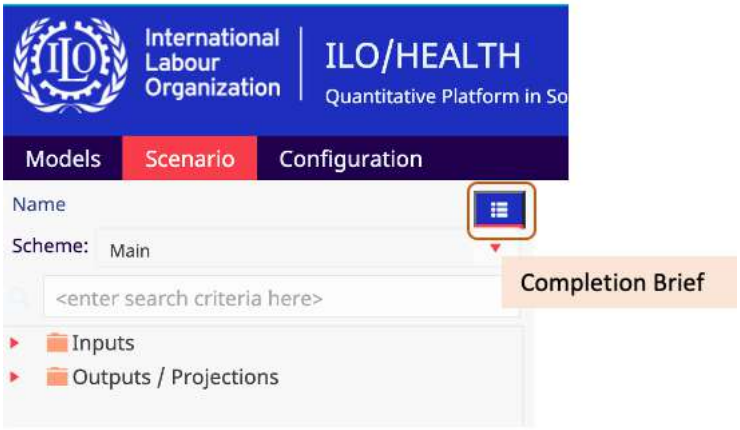
Users can select a scenario and select the Completion brief in the Scenario menu. This opens a window with a list of the full set of input matrices in the scenario. The list has five columns relating to matrices: Code, Name, Number of users who have currently checked out the matrix, whether the matrix is currently checked out by users, and completion percentage .[23] Filter and sort options are

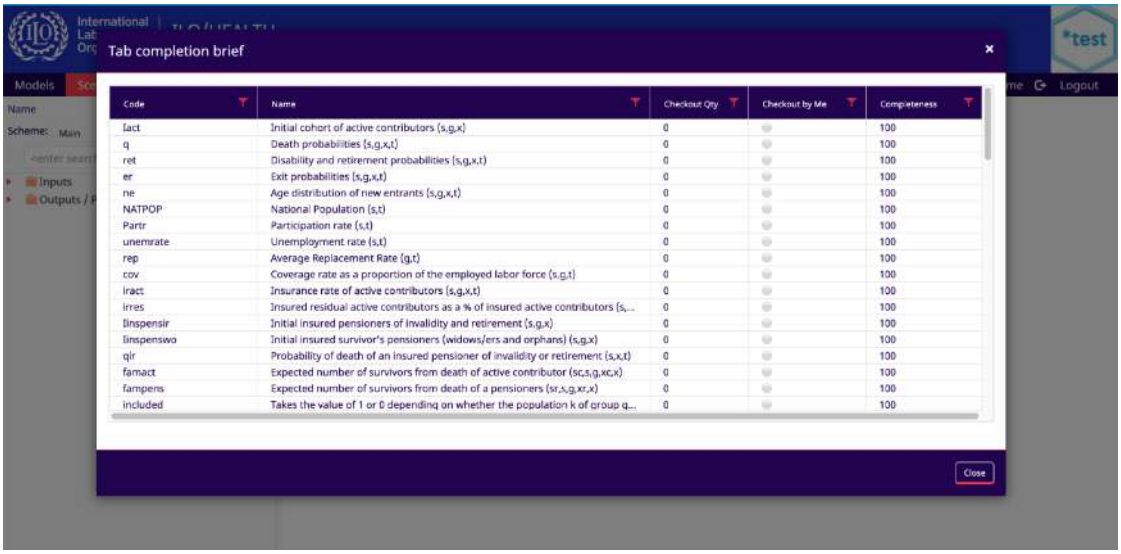
[22] A Confirm/Cancel message box will ask: Do you really want to delete the selected scenario?

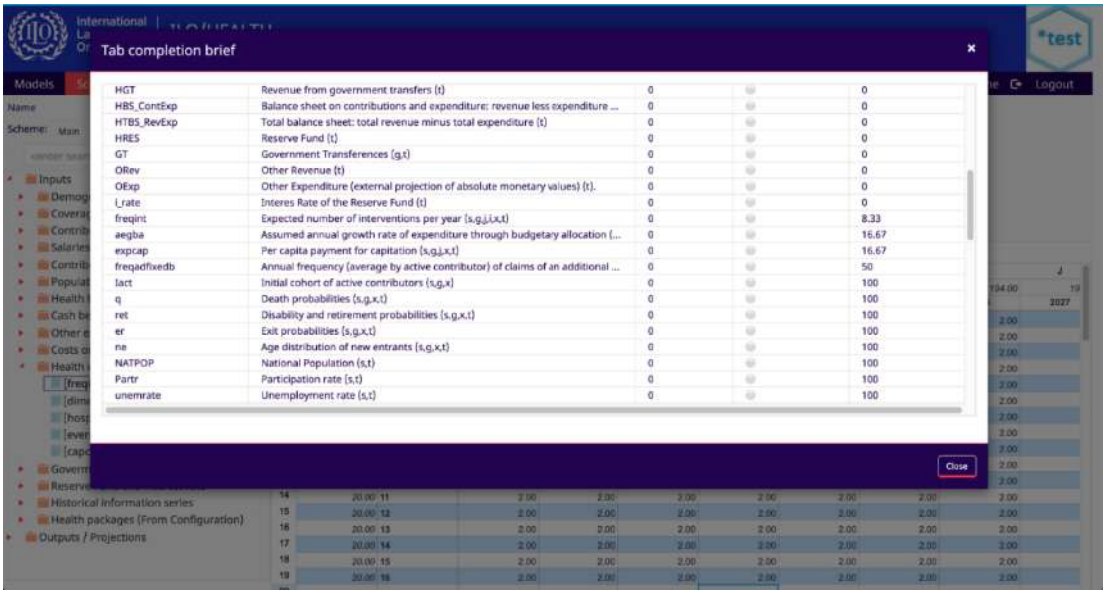
[23] The percentage of matrix tabs that have at least been opened, checked out and checked in (with or without changes). This does not refer to the percentage of proper completion, as this is a decision for users.

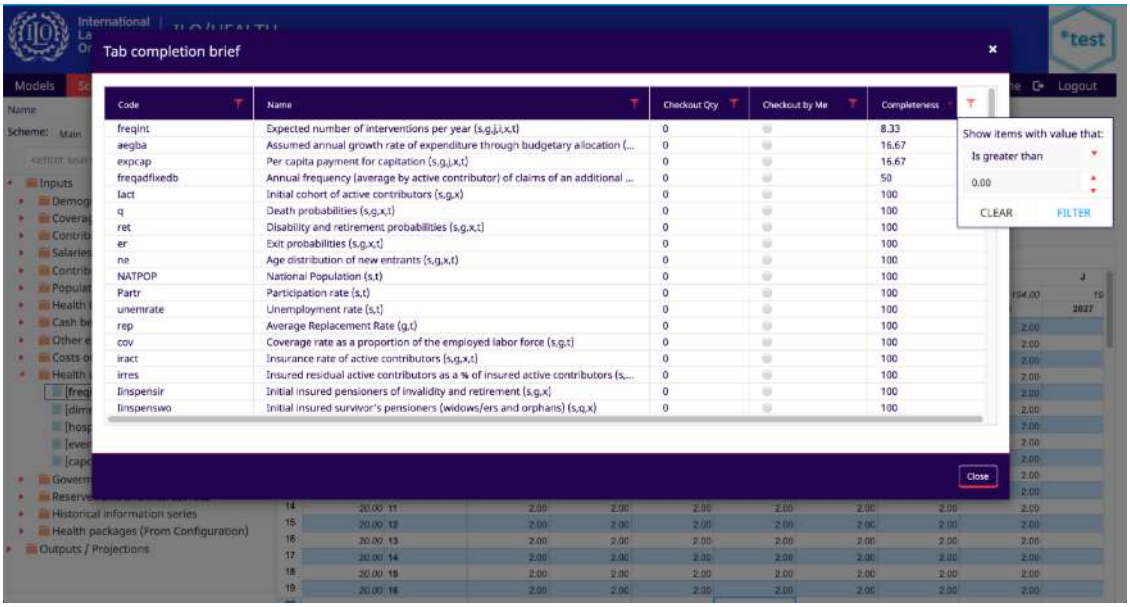
available. **The list is useful for determining which matrices require additional attention to complete the work**.

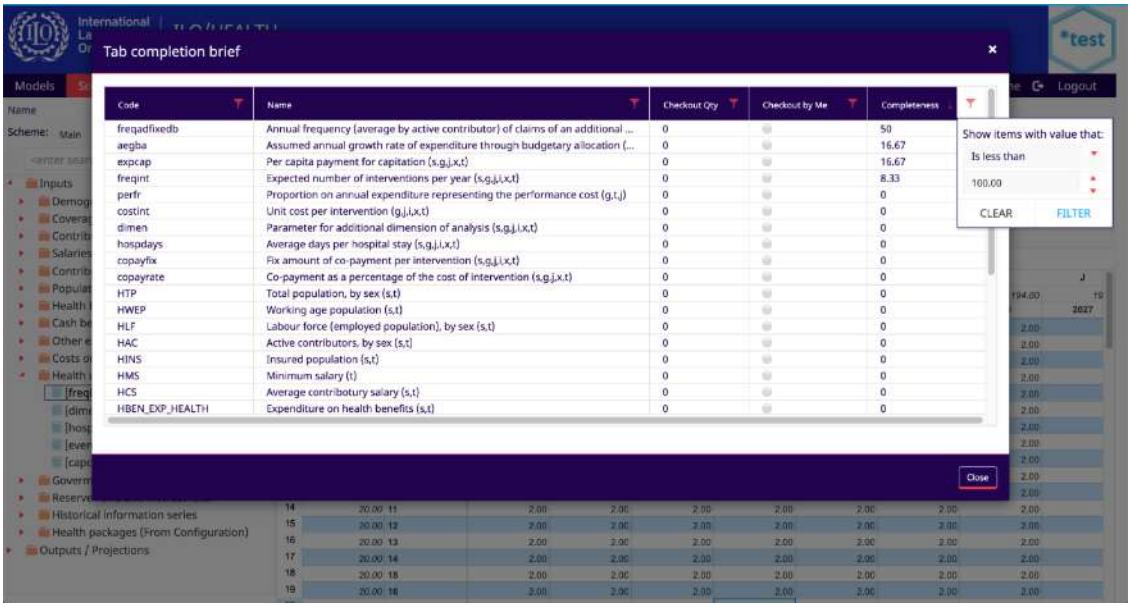
The Completion brief can also be opened from within an open matrix by selecting the blue icon with three lines above the navigation tree (circled in red below). The navigation tree is the menu on the left with all the files related to inputs and outputs.






Tab completion brief
HGT Revenue from government transfers (t) 0 0
HBS_ContExp Balance sheet on contributions and expenditure: revenue less expenditure ... 0 0
HTBS_RevExp Total balance sheet: total revenue minus total expenditure (t) 0 0
HRES Reserve Fund (t) 0 0
GT Government Transferences (g,t) 0 0
ORev Other Revenue (t) 0 0
OExp Other Expenditure (external projection of absolute monetary values) (t). 0 0
i_rate Interes Rate of the Reserve Fund (t) 0 0
freqint Expected number of interventions per year (s,g,j,i,x,t) 0 8.33
aegba Assumed annual growth rate of expenditure through budgetary allocation (... 0 16.67
expcap Per capita payment for capitation (s,g,j,x,t) 0 16.67
freqadfixedb Annual frequency (average by active contributor) of claims of an additional ... 0 50
lact Initial cohort of active contributors (s,g,x) 0 100
q Death probabilities (s,g,x,t) 0 100
ret Disability and retirement probabilities (s,g,x,t) 0 100
er Exit probabilities (s,g,x,t) 0 100
ne Age distribution of new entrants (s,g,x,t) 0 100
NATPOP National Population (s,t) 0 100
Partr Participation rate (s,t) 0 100
unemrate Unemployment rate (s,t) 0 100
Close


Tab completion brief
Code Name Checkout Qty Checkout by Me Completeness
freqint Expected number of interventions per year (s,g,j,i,x,t) 0 8.33
aegba Assumed annual growth rate of expenditure through budgetary allocation (... 0 16.67
expcap Per capita payment for capitation (s,g,j,x,t) 0 16.67
freqadfixedb Annual frequency (average by active contributor) of claims of an additional ... 0 50
lact Initial cohort of active contributors (s,g,x) 0 100
q Death probabilities (s,g,x,t) 0 100
ret Disability and retirement probabilities (s,g,x,t) 0 100
er Exit probabilities (s,g,x,t) 0 100
ne Age distribution of new entrants (s,g,x,t) 0 100
NATPOP National Population (s,t) 0 100
Partr Participation rate (s,t) 0 100
unemrate Unemployment rate (s,t) 0 100
rep Average Replacement Rate (g,t) 0 100
cov Coverage rate as a proportion of the employed labor force (s,g,t) 0 100
iract Insurance rate of active contributors (s,g,x,t) 0 100
irres Insured residual active contributors as a % of insured active contributors (s,... 0 100
linspensir Initial insured pensioners of invalidity and retirement (s,g,x) 0 100
linspenswo Initial insured survivor's pensioners (widows/ers and orphans) (s,q,x) 0 100
Show items with value that:
Is greater than
0.00
CLEAR
FILTER
Close



5.4. Navigation tree

After opening a scenario, the navigation tree appears, accompanied by the Matrix window. The navigation tree is divided into two main sections, Inputs and Outputs. The Inputs section is designed in to easily locate matrices and helps guide the process of filling in the model. The Outputs section attempts to facilitates the inspection and analysis of results in an intuitive way.

5.4.1. Inputs

Under Inputs, the sections of the navigation tree are:

Demographic, economic and labour force, which is associated with the national context with which the schemes will interact. The transition from this context to more scheme-specific populations is in the **Coverage** folder**.** All contributor projections and transitional dynamics are in the **Contributors** folder**.**

In the financial sphere, the **Salaries** folder contains the matrices needed to project the main salary aggregate. These become contribution flows via the matrices in **Contribution rates.**

The folders that follow are mostly related to access to healthcare services and their expenditures: **Population entitled to healthcare services** links the contributors and the initial set of non-contributing insured members to project access to healthcare services over time. **Health utilization frequencies and coverage** shows the demand for services when those services are paid by unit. The costs of these services appear in **Costs or fees for health services.** The folder **Healthcare expenditure** refers to services that are paid by budget allocation.

Cash benefit expenditure includes the comprehensive set of matrices that reproduce the formulas for cash benefits. Other cash flows not included in the Cash benefits and Healthcare services expenditure can be input in matrices belonging to the **Government transfers and other revenue** and **Other expenditures** folders. The folder **Reserve fund and interest rate** contains the data on contingency reserves and their return.

Finally, the **Historical information series** helps with consistency reviews.

5.4.2. Basic output matrices

This section describes the key information available in the main output matrices and potential uses for this information. Generally, the section moves from the more general to the more specific matrices, and from those that will be used in nearly every actuarial exercise to those that will only occasionally be accessed for detailed calculations. Users can explore the matrices in detail. Ideally, they should begin by studying the simpler matrices (those that have only one column with a time dimension) that can be plotted as a line or bar chart. Users can then move to matrices with age (in rows) and time (in columns) that can be plotted as areas or line charts to make year-over-year comparisons.

5.4.2.1. *Financial report matrices*

Users normally first look at the Revenue and Expenditure Table [RPT_TRE] in the **Tables/Aggregated Financial Results** folder. This table is where users can identify the main financial projections of the scheme crucial to scheme sustainability. The filepath for this is: Outputs/Projections > Tables/Aggregated Financial Results > RPT_TRE.

The table contains three columns: Income, Expenditure and Results.

In the **Income** section, the first column is Salary mass, showing the level of potential insurable resources. The second column shows Contributions (calculated over the Salary mass), followed by Government transfers, Interest income, Co-payment and Other income. The final column of the section is Total income, the sum of all income items.

The **Expenditure** section has a Benefits subsection that shows the Value of healthcare and cash benefits and their subtotal. Besides benefits, the section has Administrative expenditures, Other expenditures and a Total of all expenditures (sum of the total of benefit, administrative and other expenditures).

The net results are in the **Financial Results Table** [RPT_TFR] in the same section of the navigation tree. The first column, Result, corresponds to the difference between Income and Expenditure, followed by PAYG rate that shows the ratio between Expenditures and Salary mass. This is followed by Reserve, which shows the expected value of the fund's reserve, while Reserve coefficient shows the frequency with which the reserve covers annual expenditures.

5.4.2.2. *Demographic report matrices*

The **Main Demographic Aggregates Table** [RPT_MDAT] shows the sizes of the key demographic aggregates. It is found in Outputs/Projections > Tables/Aggregated Financial Results > RPT_MDAT.

The columns have two main sections: First, the Contributors-related section, with information on the Total population, Labour force and the Total active contributors. Second, the Insured-related section, with information on the number of insured in groups: Current active, Residual, Pensioners and Family dependants, followed by Total insured. Finally, the report has two columns of indicators: Coverage of contributors with respect to the Labour force and Coverage of insured over the Total population.

5.4.2.3. *Financial Indicators*

The Financial Indicators folder corresponds to a data series employed to highlight certain aspects of a projection. They are the results of comparisons between projection results and are therefore replicable. ILO/HEALTH automatically calculates them as they are frequently requested in actuarial valuations.

5.4.2.3.1. Expenditure ratios

These indicators are comparisons of certain expenditure items or total expenditures with other aggregates. They assess the magnitude of these expenditures with respect to the economy in the case of [EXPHEALTH_GDPper], Expenditure on health benefits as a percentage of GDP and [T_EXP_GDPper], Total expenditure as a percentage of GDP. They may also assess the relative efficiency of expenditures as in the case of [admin], administrative expenditures as a percentage of total expenditures.

5.4.2.4. *Demographic indicators*

In addition to financial indicators, ILO/HEALTH provides a set of demographic indicators. These can be found in Outputs/Projections > Indicators > **Demographic Indicators** and are of two types:

5.4.2.4.1. Coverage rates

Ratios between demographic aggregates help users analyse how the schemes affect their target population. There are two kinds of coverage: Active coverage, which compares active contributors over time with the Labour force [AC_LFcr] for the total, or [AC_LFcrs] by sex; and Beneficiary coverage, which compares the number of insured to the national population [IP_NPcr] and [IP_NPcrs]. The higher the coverage, the more progress in making the scheme universal. These can be found in Outputs > Demographic Indicators.

5.4.2.4.1.1. Average age

These indicators ([ACaas] [Acaa], [TIaas], [TIaa], [NCaaas], [NCaa]) show the average age of contributors or beneficiaries by sex over the years. They can be found in Outputs/Projections >

Demographic Indicators. This is useful to assess the characteristics of typical insured or contributors and their changes over time (for example: ageing of the contributors, etc).

5.4.2.5. *Contributors and insured members*

The main aggregate groups for contributors are accessible in varying levels of detail for users interested in understanding group dynamics.

5.4.2.5.1. Yearly aggregates by sex and group

This is the simplest level of detail possible: A time series by sex that shows the total number of individuals of a group without age details. This level of detail is available for Total number of active contributors of a group [Tact] in the folder Outputs/Projections > **Contributors/insured members**, Total insured from active [RPT_MDAT_E] and Total insured pensioners [RPT_MDAT_G] in a group with detail by sex in the folder Outputs/Projections > **Insured Population and Coverage / Summaries**.

5.4.2.5.2. Year and age crosstabs

These tables show the years in the columns and the age in the rows. This level of detail allows users to see demographic transitions (the "diagonal" ageing of cohorts). These tables are available for the following groups: Active contributors [act], Active insured, Residual insured, Pensioner insured and Family insured ([Insact], [ResIns], [Inspensir], [Inspenswo] and [FamIns]). Other groups shown with this detail are residual groups of contingencies, for example: Active contributors that survived death, disability and other exits [Survact], and the Deaths from the insured groups, [Tdeath].

5.4.2.6. *Salary matrices*

Similarly, the salary matrices relate income to age for active contributors. There are three salary matrices: [Tsal] contains the Theoretical salary and [sal] contains Projected salary. Both are shown by age and sex for each group over a given year, with years shown in columns and age in rows. Additionally, there is a matrix for the average Salary of the group [salt]. These are found in Outputs/Projections > Salary Averages / **Salary Mass**.

5.4.2.7. *Expenditures*

5.4.2.7.1. Healthcare expenditures

Users can assess the total expenditure per package in the matrix [EXP] in Outputs/Projections > Health Expenditure. Details on the number of interventions for services paid by the intervention are found in the matrix [UTIL], and age details are available in [UTILx]. Both these matrices are found in the section Outputs/Projections > **Healthcare Interventions**.

5.4.2.7.2. Cash benefit expenditures

The matrices [FEXPsickallow], [FEXPmatallow], [FEXPfun], [FEXPadfixedb], [FEXPadsaldb] show the total expenditure per year and sex on sickness allowances, paternal leave allowances, funeral

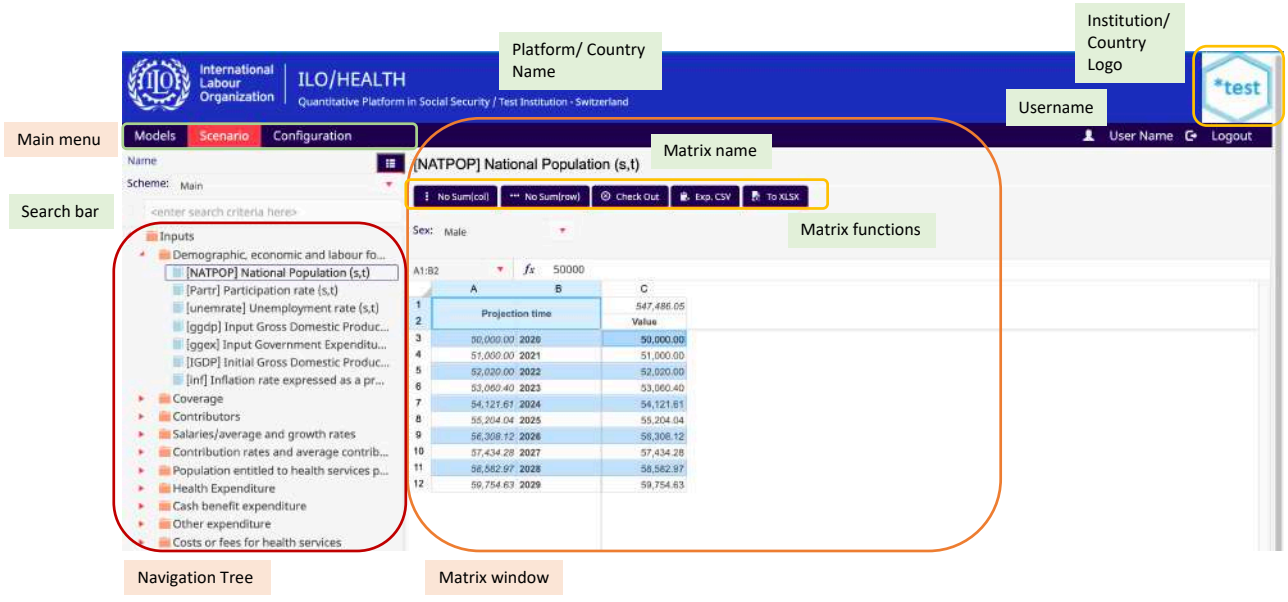
benefits, fixed ad hoc benefits, and ad hoc benefits calculated as a proportion of the salary. [BEN_EXP_CASHs] shows the total cash benefits and [BEN_EXP_CASH] shows totals for each sex. All matrices are found in the section Outputs/Projections > **Expenditure on Cash Benefits**.

5.5. Manipulation of matrices

The largest and most interesting part of the work in ILO/HEALTH occurs at the matrix level. Matrices are always part of a scenario and their number and size depend on the model set up by users. ILO/HEALTH offers many options to develop the matrices. ILO/HEALTH prioritizes remote access, teamwork and peer reviewing in modern actuarial practice in social security, in accordance with *ISSA-ILO Actuarial Guidelines*.

Users should become thoroughly familiar with the options within scenarios to properly manipulate matrices. Section 6 explains this process.

An open scenario shows its name, a selection menu to pick the scheme, the navigation tree and the Matrix window. Through the navigation tree, users can choose the matrix they need. The selected matrix is shown in the Matrix window.



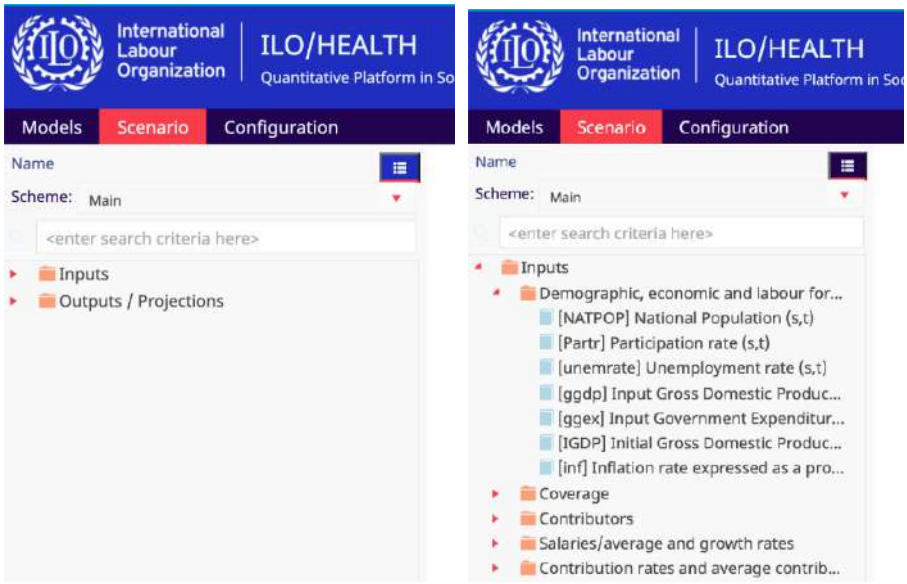
The tree consists of logically arranged folders and matrices.[24] Users can navigate through the model in the same way they would with any file explorer.

[24] For calculation purposes, ILO/HEALTH never refers to the matrices in terms of their location in the tree. This means that a rearrangement of matrices is possible without affecting the calculation function of the application. The ILO welcomes suggestions for improving the navigation tree.

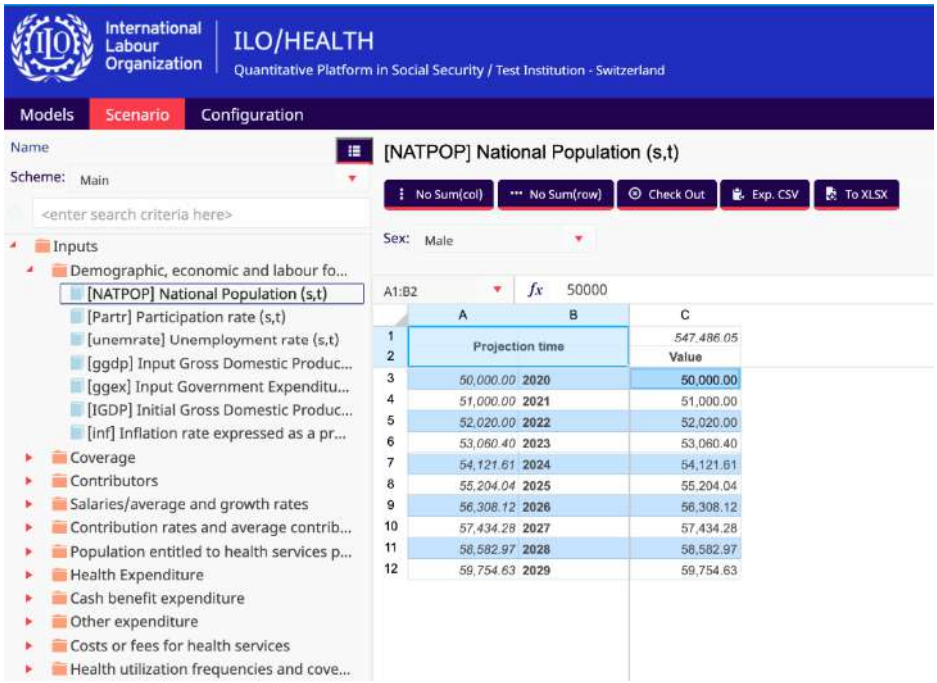
The naming of the matrices consists of two parts: the matrix code shown in brackets, which is assigned by ILO/HEALTH and is immutable, and the matrix name describing the expected contents of the matrix, its use in the modelling process and its dimensions. The matrix name can be changed over time to improve the description and improve user experiences. Frequent users should familiarize themselves with the code as much as possible.[25]

Inside the matrix window, users can see: the Matrix menu with a set of tabs that change according to the matrix, one or two list boxes for tab selection, and the selected tab shown in Excel-like columns and rows.

Users can select a matrix by clicking on its name in the navigation tree on the left. Selecting the red arrows next to the folder names (e.g., Inputs or Outputs/Projections) will open the folder(s); users can then select the matrix's name to open it.



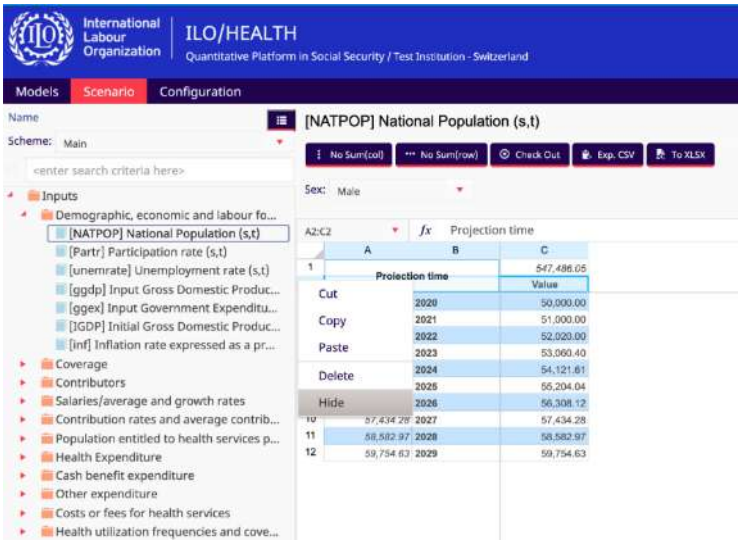
[25] The code will be extremely useful when working with exported files.

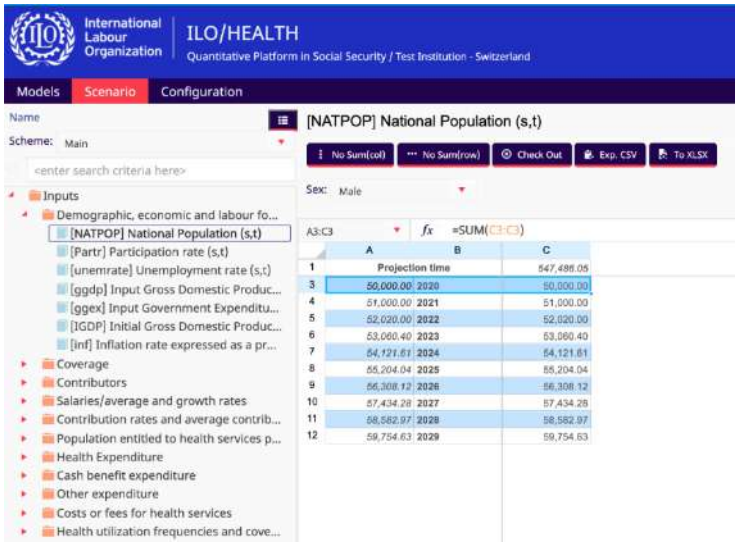


5.5.1. Aesthetic commands: Hide and show sums of rows and columns

By default, ILO/HEALTH lists the totals of the values in the row (in the case of the first column) and the totals of the values of the column (in the case of the first row). Users can hide the total in on the matrix they are working on by right-clicking on the desired row or column and then selecting Hide or Unhide from the menu or alternatively, by clicking on the option No Sum (col) or No Sum (row). However, these totals are often useful for double-checking data entered over multiple years or categories to ensure proper inputs were used.

Selecting No sum rows/columns in the Matrix window (or right-clicking and then choosing Hide/Unhide) hides/shows the first row/column of the matrix. The command is merely aesthetic and does not affect the calculations. The rows/columns will reappear the next time the matrix opens and will reappear in the next selected matrix.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
[NATPOP] National Population (s,t)
[Partr] Participation rate (s,t)
[unemrate] Unemployment rate (s,t)
[ggdp] Input Gross Domestic Produc...
[ggex] Input Government Expenditu...
[IGDP] Initial Gross Domestic Produc...
[inf] Inflation rate expressed as a pr...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[NATPOP] National Population (s,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
A2:C2
Projection time
Projection time
Value
547,486.05
Cut
Copy
Paste
Delete
Hide
2020 50,000.00
2021 51,000.00
2022 52,020.00
2023 53,060.40
2024 54,121.61
2025 55,204.04
2026 56,308.12
57,434.28 2027 57,434.28
58,582.97 2028 58,582.97
59,754.63 2029 59,754.63


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
[NATPOP] National Population (s,t)
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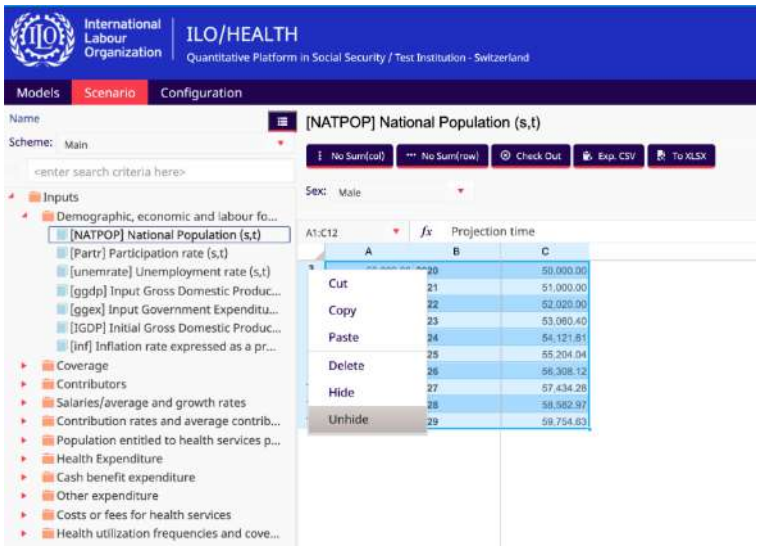
[ggdp] Input Gross Domestic Produc...
[ggex] Input Government Expenditu...
[IGDP] Initial Gross Domestic Produc...
[inf] Inflation rate expressed as a pr...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[NATPOP] National Population (s,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
A3:C3
=SUM(C3:C3)
Projection time
547,486.05
50,000.00 2020 50,000.00
51,000.00 2021 51,000.00
52,020.00 2022 52,020.00
53,060.40 2023 53,060.40
54,121.61 2024 54,121.61
55,204.04 2025 55,204.04
56,308.12 2026 56,308.12
57,434.28 2027 57,434.28
58,582.97 2028 58,582.97
59,754.63 2029 59,754.63


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
[NATPOP] National Population (s,t)
[Partr] Participation rate (s,t)
[unemrate] Unemployment rate (s,t)
[ggdp] Input Gross Domestic Produc...
[ggex] Input Government Expenditu...
[IGDP] Initial Gross Domestic Produc...
[inf] Inflation rate expressed as a pr...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[NATPOP] National Population (s,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
A1:C12
Projection time
Cut
Copy
Paste
Delete
Hide
Unhide
50,000.00
51,000.00
52,020.00
53,060.40
54,121.61
55,204.04
56,308.12
57,434.28
58,582.97
59,754.63

There is no way to hide the rows/columns permanently. Users are advised to work without focusing on them and to hide them if they are distracting for tasks requiring lengthy periods viewing the same matrix. Hiding them every time a matrix opens will take a considerable amount of time.

5.5.2. Exporting commands: Exp.CSV and To XLSX

While ILO/HEALTH offers an adequate environment for storing information and running projections on healthcare schemes, some tasks may be easier to perform in a traditional worksheet programme (such as MS Excel or Google Sheets). Fortunately, ILO/HEALTH offers export options to facilitate the integration of ILO/HEALTH with some of the more popular spreadsheet programmes.

Working on ILO/HEALTH in MS Excel is easier when users' Excel format aligns with that of ILO/HEALTH. There are two ways to resolve problems that may arise when working with csv files:

1. Changing MS Windows system preferences in terms of number formatting settings, date and time, region, additional date, time and regional settings, region (change date, time or number format) and additional settings. Users should change the decimal symbol for ".", while changing the digit grouping symbol to any other except "."
2. Changing only MS Excel preferences: Users should select the File tab, and then Options. In the Excel options dialog box, in Advanced, they should enter the Use system separators checkbox. In the appropriate fields, users should enter symbols for the decimal separator (".") and for the thousands separator (",").

The two possible formats for exporting the data are csv and xlsx. The former is a flat format similar to txt. The format transforms each row of a table into a line of text. The end of a column is marked by a comma (hence comma separated values, csv). The csv files only record text values but not how those values were calculated (values only, not formulas).

5.5.3. The Check Out command

The real manipulation of matrices requires the proper use of the Check Out/Check In commands. These are the key to all teamwork and remote access capabilities of ILO/HEALTH.

Selecting the Check Out command gives users the exclusive right to edit a matrix up to the moment they do the Check In. While one editor/user holds the editing rights to a specific matrix, all other users with editing rights can only read the latest version of the matrix in the scenario. To protect the integrity of the information, no one can edit any matrix without checking it out.

Establishing protocols for who can check out and edit the matrices is crucial for avoiding conflicts and managing resources while working as a team. The Check Out tab opens a set of additional options for working with the matrices.

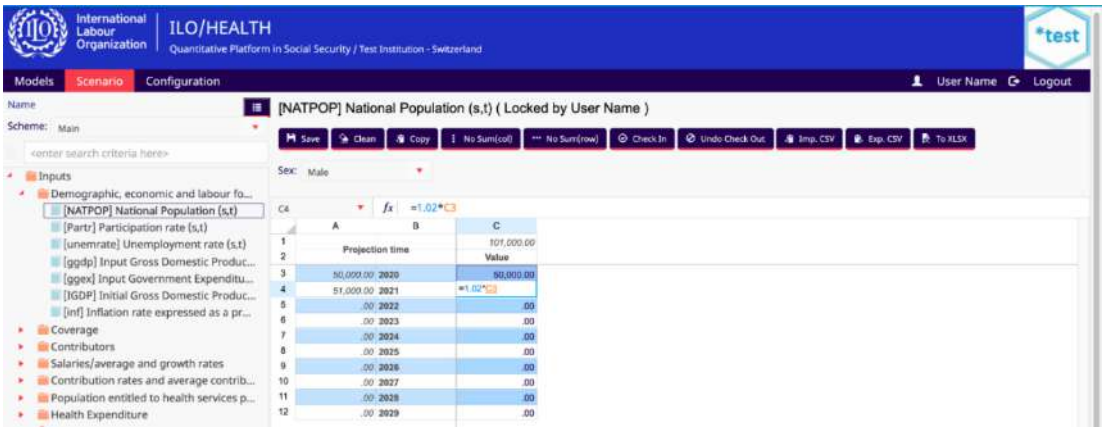
5.5.3.1. *Direct writing*

Users who do not first check out the available matrix will be unable to manipulate it.

When users check out, they will be able to edit existing information or add new information as easily as in any other spreadsheet programme: type the number, use '.' as the default decimal separator and then select enter.

5.5.3.2. *Using cell references*

Users can alternatively use an Excel-like reference of one entry for the value of another entry. As in Excel, users should start writing their formula with '=' (not '+'), followed by the typical mathematical operators: '+', '-', '*', '/' and '^' for sum, subtraction, multiplication, division and powers, respectively, parenthesis and a collection of functions.[26] Users can directly write the entry reference in the formula or use the mouse (or keyboard) to select the entry.



ILO/HEALTH will always save the entries as numbers. Even if users obtained these numbers by entering calculations or using formulas, the software records or copies them from other sources as numbers. The Functions option helps save users time by allowing them to copy and spread

[26] Unlike in Excel, '+' is not allowed for formula reference.

calculations through ranges. However, when users exit the matrix, all formulas in the matrix will be replaced by their results, expressed as numbers without a record of the calculation method.

Users should also pay attention to the format of each cell – remembering to enter numbers without any spaces or commas, and where applicable, to check percentages after entering them to confirm that they are correct. (Problems can often be resolved by dividing or multiplying by 100.)

5.5.3.3. *Using Ctrl+C to copy*

Users can change the value of a set of entries by copying the entries from another region of the matrix, another matrix or another programme. They can copy them in the matrix by pressing Ctrl+C (or Command+C on a Mac OS). An alert will appear if the size of the copied area does not match the size of the destination area. This method should not be confused with the copy function, which is explained in section 5.5.3.7 – Copy mechanisms.

5.5.3.4. *Clean*

By selecting the Clean tab, users can erase all information entered into the matrix. This function helps users avoid confusion between new and old data. In the event the wrong selection is made, users should select Undo Check Out.

5.5.3.5. *Undo Check Out*

This tab allows users to go back to the matrix in the pre-check out version, meaning that none of the changes (writing, formulas and cleaning) made from the check out have any effect and the matrix remains unchanged. The option is available until the user selects Save.

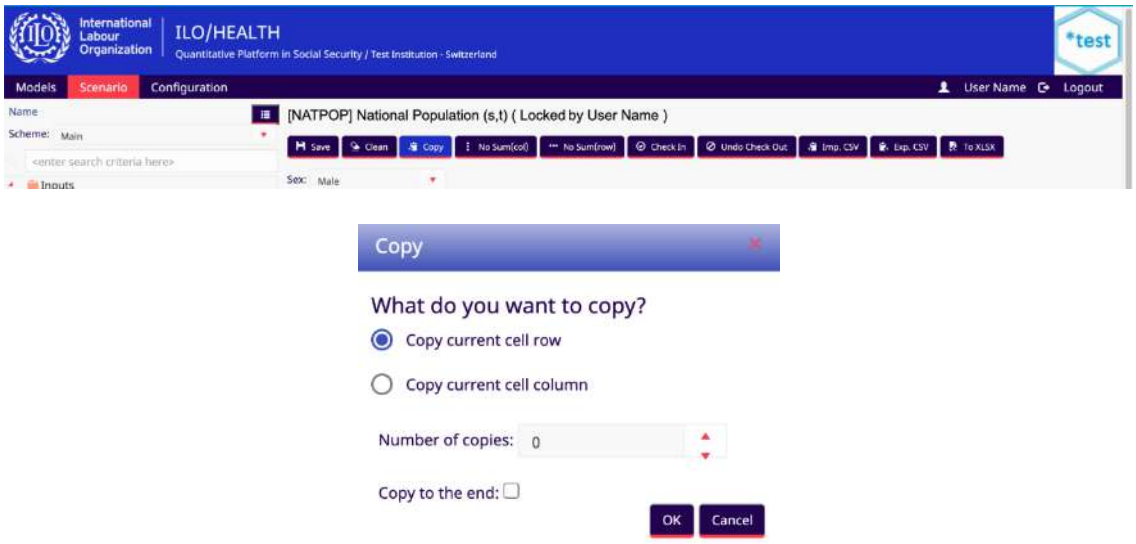
5.5.3.6. *Save*

All changes made by selecting Save are saved in the matrix. This function helps to save progress on work in a matrix before continuing to other sections of the matrix. Should ILO/HEALTH unexpectedly close, any checked-out matrices will be stored in the last saved version available. Once users select Save, the saved version is stored and the option to return to the pre-check out version disappears.

5.5.3.7. *Copy mechanisms*

ILO/HEALTH has a copy function that differs slightly from those in familiar programmes. This option allows users to copy:

- the values of a given row to a set number of rows that follow (below the given row);
- the values of a given column to a set number of columns that follow (to the right of the given row);
- the values of a given row to all rows that follow; and
- the values of a given column to all the columns that follow.



All those options are possible by selecting an entry, selecting Copy and choosing the combination of options in the menu box shown here.

5.5.3.8. *Imp CSV*

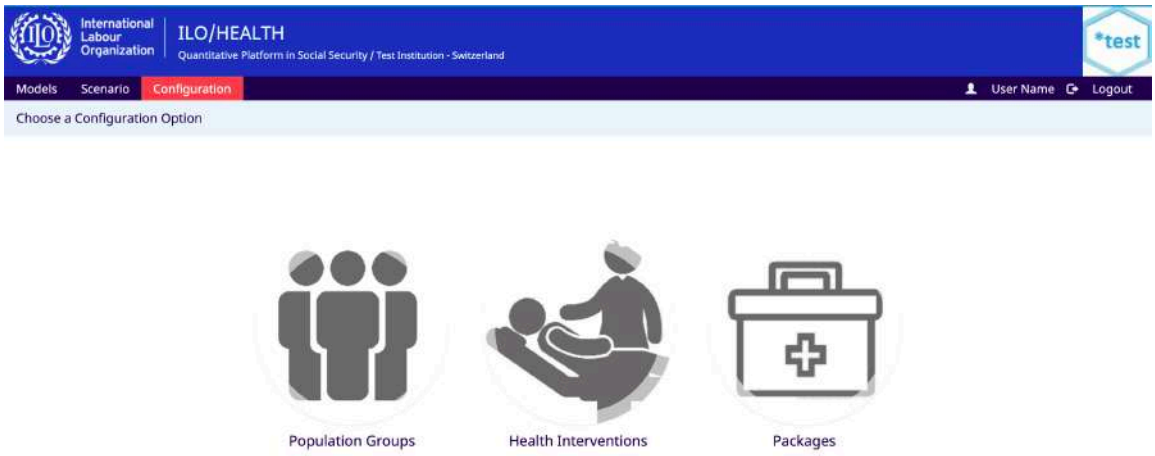
A primary goal of ILO/HEALTH is to be able to exchange information with other spreadsheet platforms with ease. The Imp CSV function allows users to import full data sets stored in a csv format into a matrix in the ILO/HEALTH platform as long as they have the same dimensions. This allows users to utilize information from other spreadsheet platforms to easily fulfil ILO/HEALTH requirements.

5.5.3.9. *Check In command*

Upon finishing editing a matrix, the user must use the Check In command to save all changes made in the matrix and to allow other users to make changes.[27] Users should always check in their matrix after they have finished working on it to save changes, input it into the system, and increase the completion rate.

5.6. Configuration of ILO/HEALTH

ILO/HEALTH adapts to the need for flexibility and customization that all actuarial work in the healthcare sector requires. This goal is achieved through the Configuration menu, which allows users to name their own population groups, healthcare interventions and packages.



5.6.1. Population groups

In terms of configuration, the population group identifies the group of people who share a certain set of characteristics and are part of the scheme. In the configuration menu, users can opt to eliminate inactive population groups (those not used in existing models) or add groups by selecting

[27] The Check In command is equivalent to Save and then Check In. If users do not want to save changes, the only alternative is Undo check in. If users previously saved changes, the Undo check in is not available. Exiting the matrix without saving will enable users to return to the last saved version of the matrix.

New and entering a unique name. Users can also modify and save changes to an existing group's name. Additionally, when user request to add a population group to a scheme in a new model, they are shown the list of existing groups and add new ones.

5.6.2. Healthcare Interventions

Like population groups, each healthcare intervention requires a unique name. In the same menu, users can modify names or delete inactive healthcare interventions or select New and enter a non-duplicate name. Additionally, when users request to add a healthcare intervention to a new package, they are shown the list of existing interventions and can add new ones.

5.6.3. Packages

The package is the most complex and interesting part of the configuration. The concept of a package in the model is not necessarily the same as the policy or administrative definition used in some countries. A package consists of a set of healthcare interventions to be offered to population groups and that all share a payment method.

For example, if a population group receives healthcare, health intervention A is paid by "payment per intervention" while health intervention B is paid by capitation, for which reason they cannot be modelled in the same package. Neither can they be in the same package if both are covered by a budget allocation but are offered to different population groups.

It is possible to include the same healthcare intervention in two different packages; it is even possible that the same interventions are provided to the same group via two packages. The modelling team is responsible for avoiding double accounting.

Besides the options to delete and change names, users can add new packages by selecting New. Users must add a name, select the payment method and finally add (using the plus sign next to the box of healthcare interventions) the healthcare interventions from the available list.

Users cannot modify the list of packages outside of the Configuration menu.

6. ILO/HEALTH Walkthrough

This section is for:

- *All practitioners who will interact frequently with the platform, especially those leading actuarial teams*

In this section, users will learn:

- *How to log in to ILO Health, create a practice model and baseline scenario*
- *Tricks and tips to manipulate matrices in the practice scenario in the model and in MS Excel (See ILO/HEALTH Platform Cheat Sheet of commands)*
- *How to fill in demographic and financial matrices and the rationale behind them*
- *How to complete and run the model*
- *How to explore output matrices with key demographic and financial indicators*

This section will use some of the functions explained in section 5 to give prospective users some hands-on experience with ILO/HEALTH and introduce them to tricks that will it make easier to fill in the required matrices. Steps are indicated with the following arrow: "→".

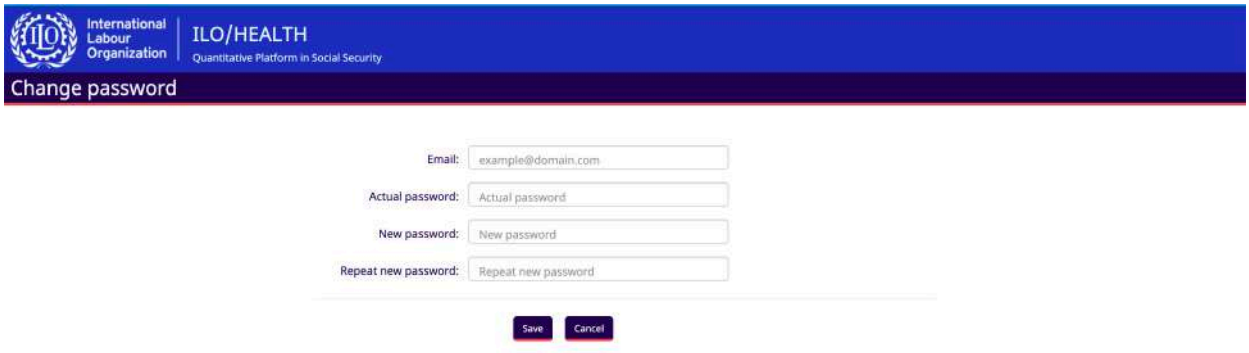
6.1. Logging in, creating a practice model and a practice base scenario

As mentioned, the main idea of this section is to practice and interact with ILO/HEALTH; the results are secondary.

6.1.1. Log in

➔ Users should check the email account used for registration to obtain their login credentials for ILO/HEALTH. See the ILO/HEALTH webpage: https://qpss.ilo.org:9081/. When first-time users visit this page, they should enter their email address, **but should not enter the assigned password.** Instead, they should select the "Change password" option, create a secret password,[28] and log in.

[28] Users should remember that it is their responsibility to respect colleagues' working spaces. Sharing login credentials means taking responsibility for any irreversible changes that the user with whom credentials have been shared may make.

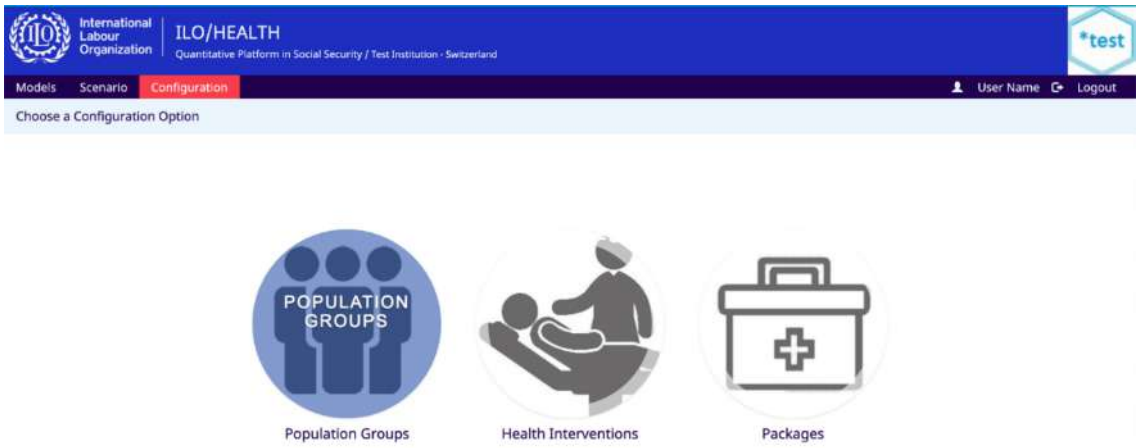


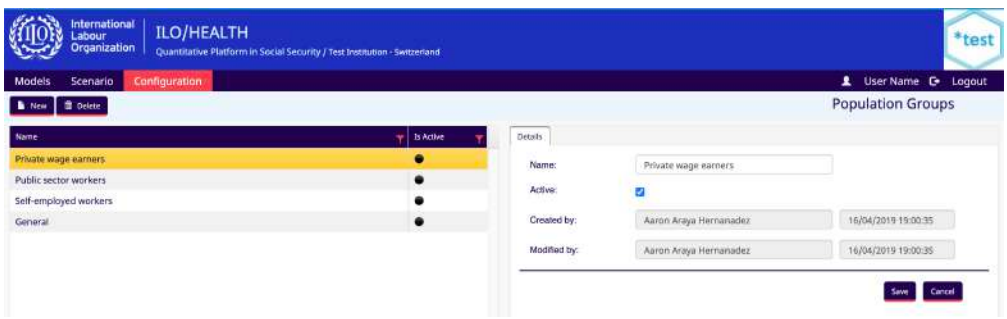
6.1.2. Create the structure for a practice model

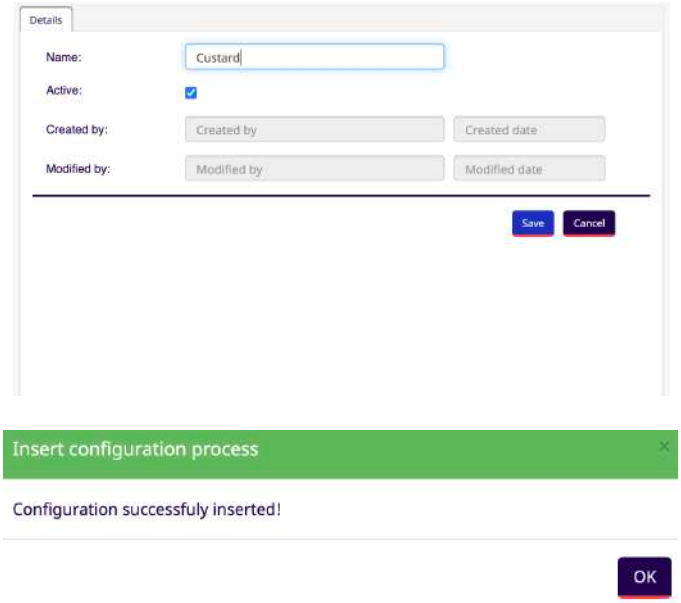
6.1.2.1. *Create the population group*

In ILO/HEALTH, users should select Configuration, where three options will appear: Population Groups, Health Interventions and Packages. They should select Population Groups to access a list of the population groups already registered in the page. For example, to add a group, users should:

- ➔ Select “New”
- ➔ In the space for Name, users should write the name of their favourite dessert
- ➔ Press “Save”

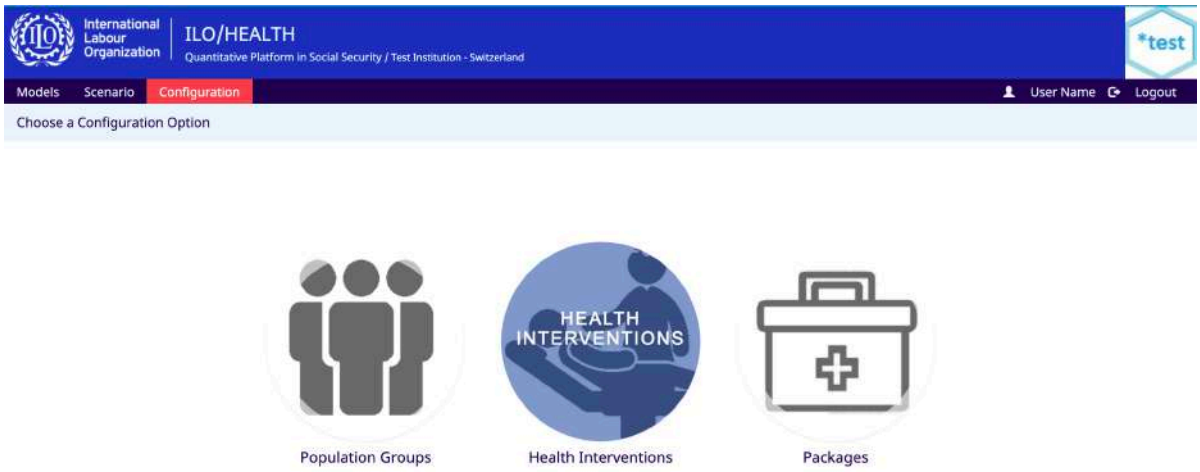






6.1.2.2. *Create healthcare interventions*

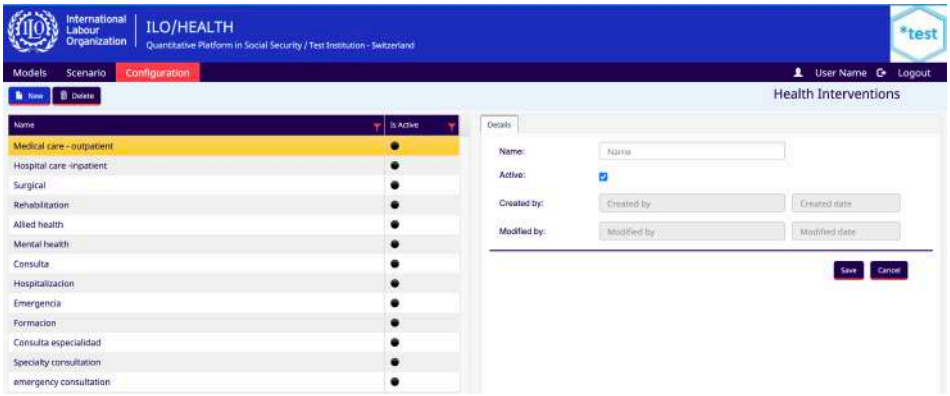
Going back to the Configuration menu, user should now select Health Interventions to access a list of all health interventions registered in the model. To add an intervention, users should:

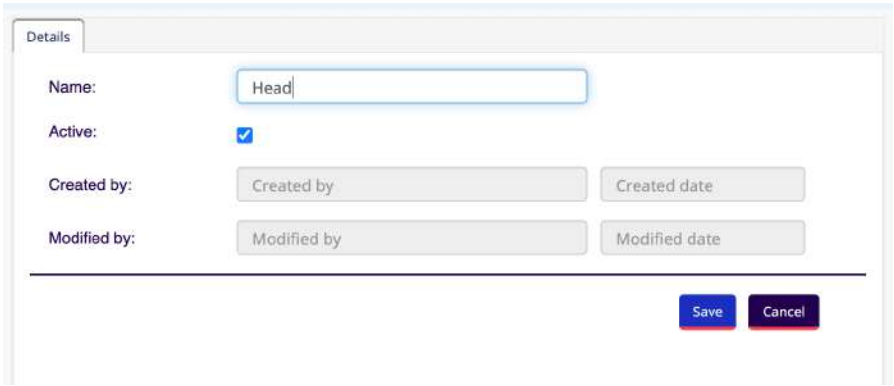


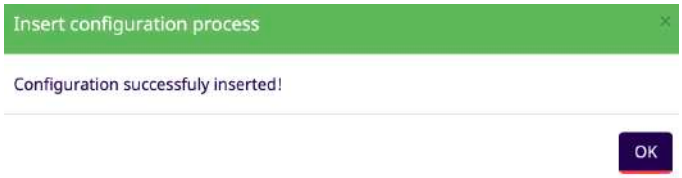
➔ Select “New”

➔ In the space for Name, write: “Head”

➔ Press “Save”







➔ Press “New”

➔ In the space for Name, write “Foot”

➔ Press “Save”

➔ Select “New”

➔ In space for Name, write: “Toes”

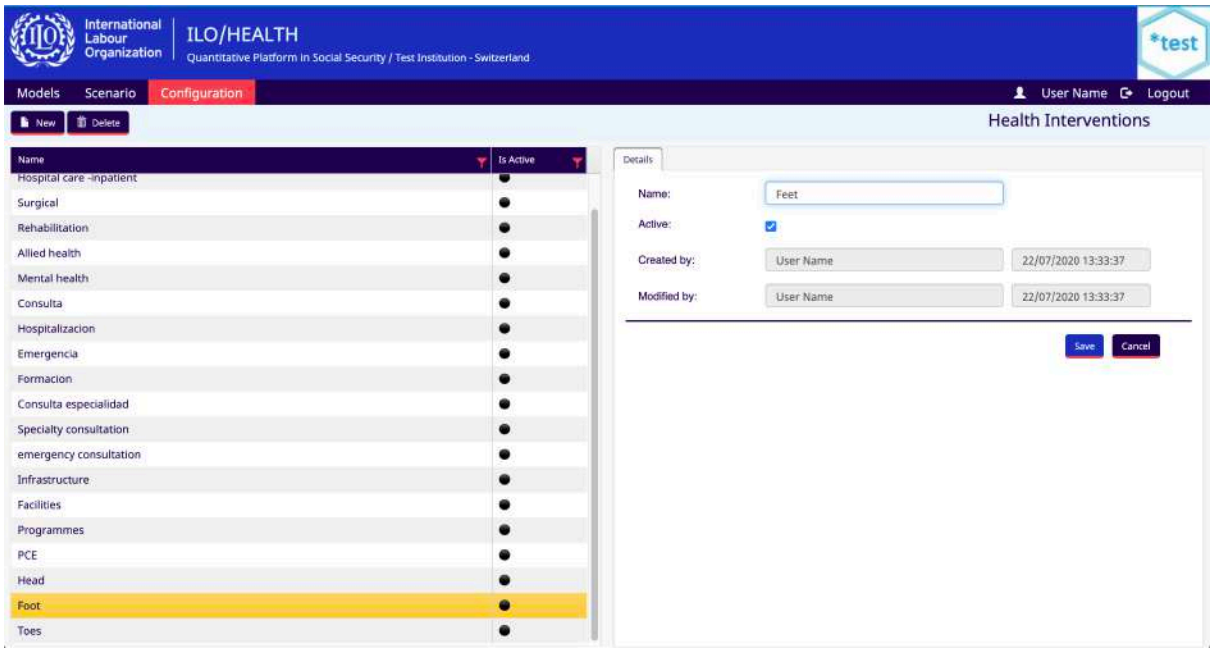
➔ Press “Save”

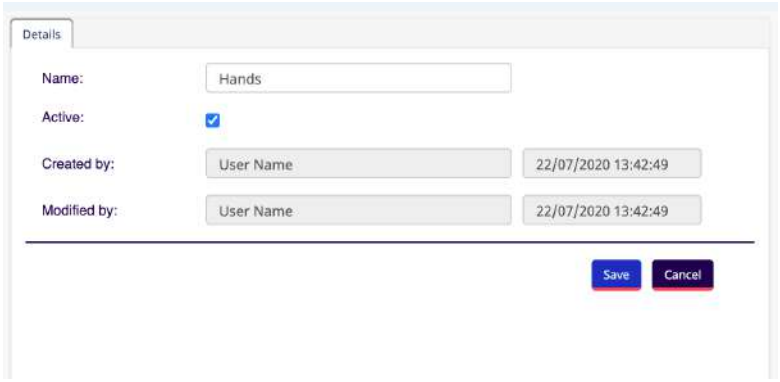
➔ Select the “Foot” healthcare intervention again

➔ Correct the name by writing “Feet”

➔ Press “Save”

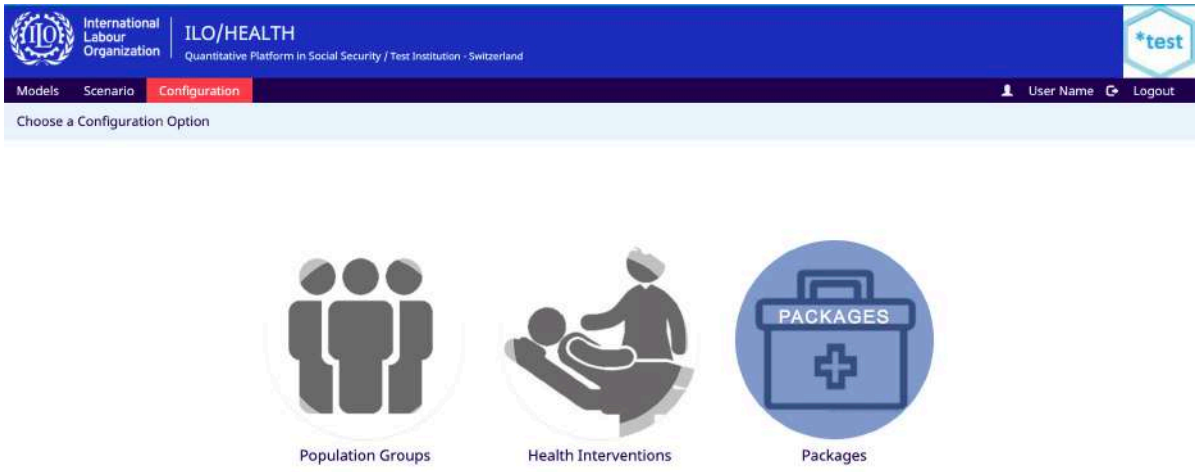
➔ Using the steps above, users should create the following interventions: Fingers, Eyes, Ears, Nose, Knees and Hands





6.1.2.3. *Create the healthcare packages*

Finally, going back to the Configuration menu, users should now select Packages to access a list of all Packages already registered in the model. To add a package, users should:



➔ Press “New”

➔ In the space for Name, write: “Capital”

➔ From the dropdown menu, they should choose the Payment method: (MP5) By health intervention in the general case

➔ Next to the box of Health Interventions, select the plus sign

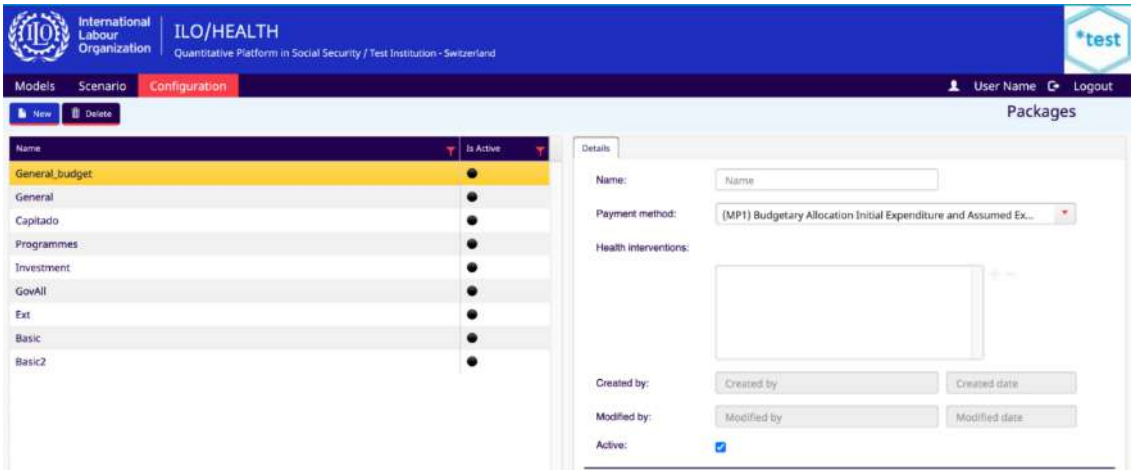
➔ In the Dissociated menu, search for Ears and press the arrow facing right to link the Intervention to the Package.

➔ Do the same with Eyes, Head and Nose

➔ Finally, next to “Create new health intervention?” Write “Teeth” in the box and press the plus sign to add an intervention that was inadvertently omitted in the previous step. This is a shortcut to create a new intervention.

➔ Select “Apply”

➔ Press “Save”


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
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User Name
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New
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Packages
Name
Is Active
General_budget
General
Capitado
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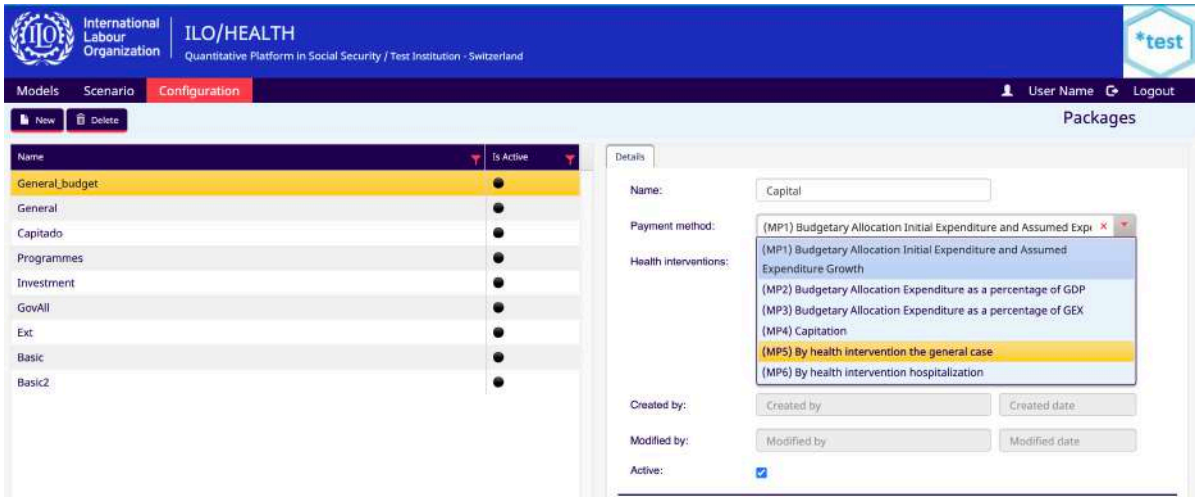
Details
Name:
Payment method:
(MP1) Budgetary Allocation Initial Expenditure and Assumed Ex...
Health interventions:
Created by:
Modified by:
Active:


International Labour Organization
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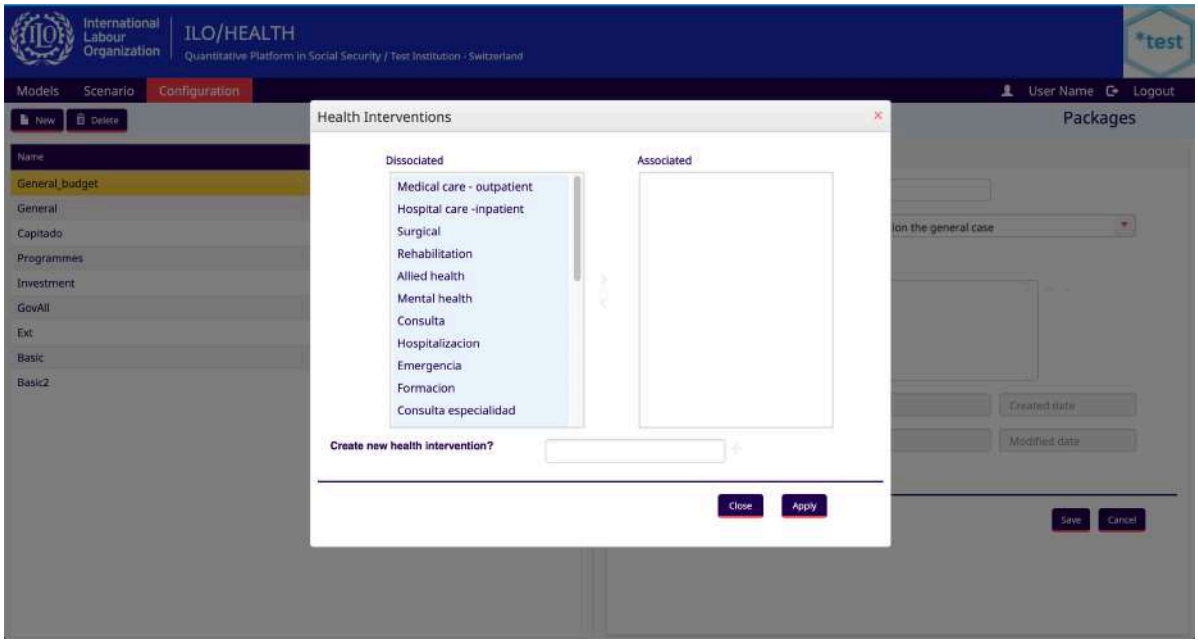
Basic2
Details
Name:
Capital
Payment method:
(MP1) Budgetary Allocation Initial Expenditure and Assumed Expe
(MP1) Budgetary Allocation Initial Expenditure and Assumed Expenditure Growth
(MP2) Budgetary Allocation Expenditure as a percentage of GDP
(MP3) Budgetary Allocation Expenditure as a percentage of GEX
(MP4) Capitation
(MP5) By health intervention the general case
(MP6) By health intervention hospitalization
Health interventions:
Created by:
Modified by:
Active:


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
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Investment
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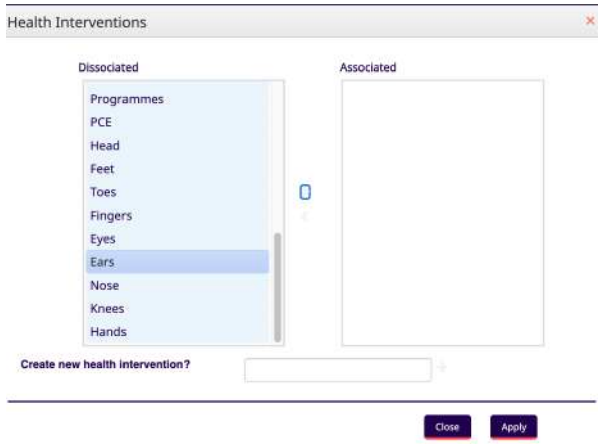
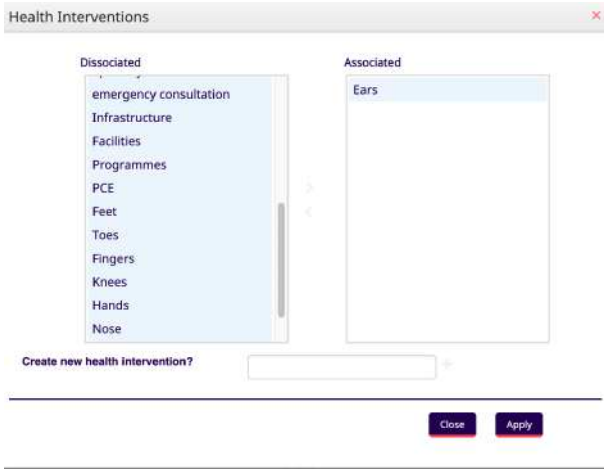
Basic
Basic2
Health Interventions
Dissociated
Medical care - outpatient
Hospital care -inpatient
Surgical
Rehabilitation
Allied health
Mental health
Consulta
Hospitalizacion
Emergencia
Formacion
Consulta especialidad
Associated
Create new health intervention?
Close
Apply
Save
Cancel


Health Interventions
Dissociated
Programmes
PCE
Head
Feet
Toes
Fingers
Eyes
Ears
Nose
Knees
Hands
Associated
Create new health intervention?
Close
Apply


Health Interventions
Dissociated
emergency consultation
Infrastructure
Facilities
Programmes
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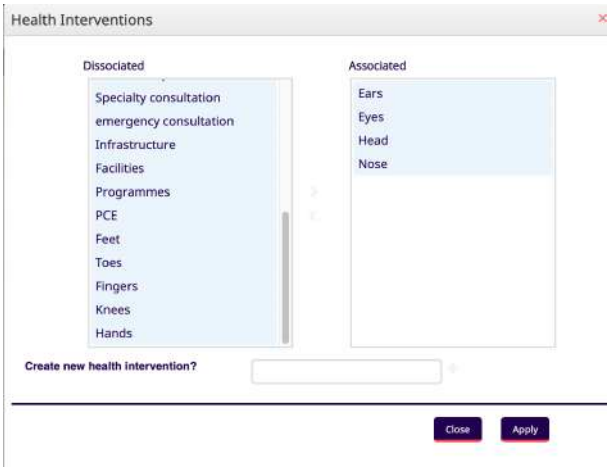
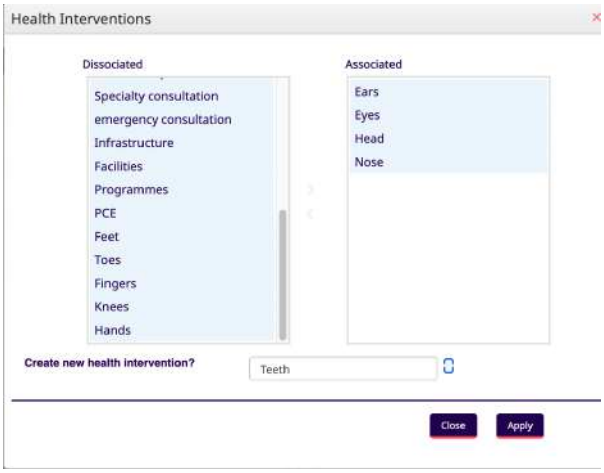
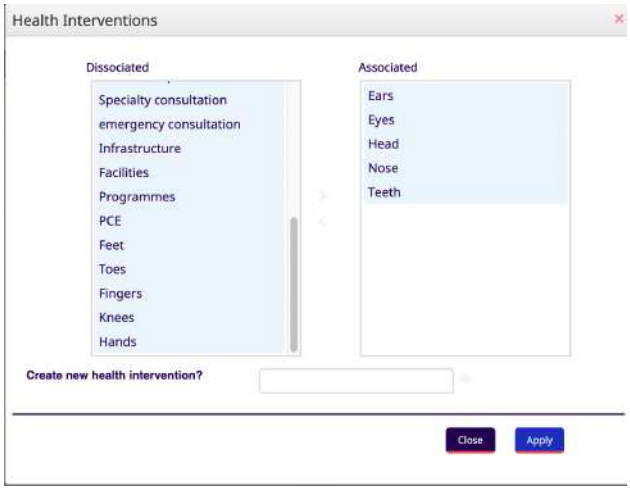
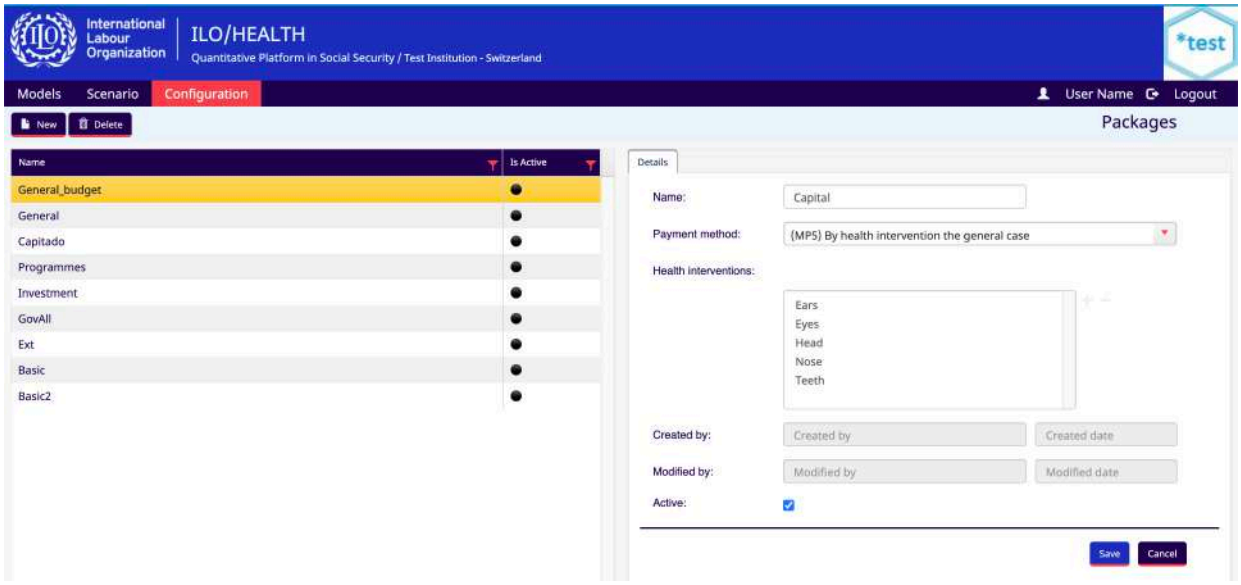
Feet
Toes
Fingers
Knees
Hands
Nose
Associated
Ears
Create new health intervention?
Close
Apply

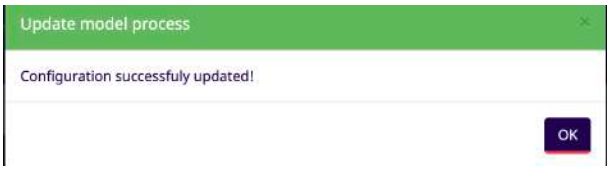

Health Interventions
Dissociated
Specialty consultation
emergency consultation
Infrastructure
Facilities
Programmes
PCE
Feet
Toes
Fingers
Knees
Hands
Associated
Ears
Eyes
Head
Nose
Create new health intervention?
Close
Apply


Health Interventions
Dissociated
Specialty consultation
emergency consultation
Infrastructure
Facilities
Programmes
PCE
Feet
Toes
Fingers
Knees
Hands
Associated
Ears
Eyes
Head
Nose
Create new health intervention?
Teeth
Close
Apply


Insert configuration process
Configuration successfuly inserted!
OK

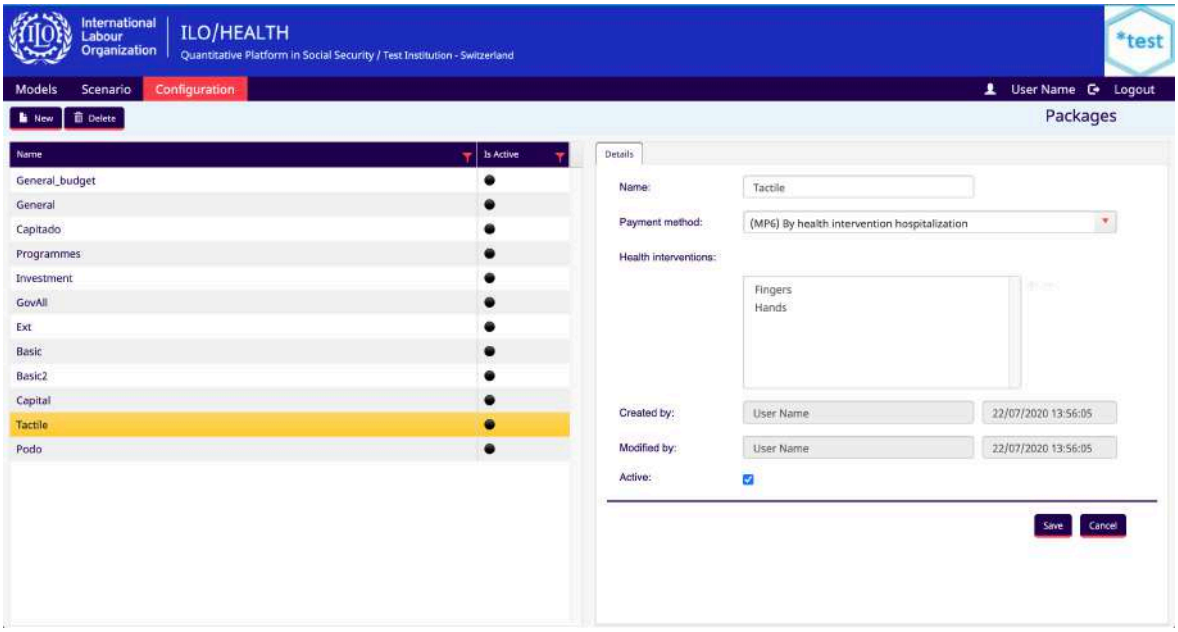

Health Interventions
Dissociated
Specialty consultation
emergency consultation
Infrastructure
Facilities
Programmes
PCE
Feet
Toes
Fingers
Knees
Hands
Associated
Ears
Eyes
Head
Nose
Teeth
Create new health intervention?
Close
Apply

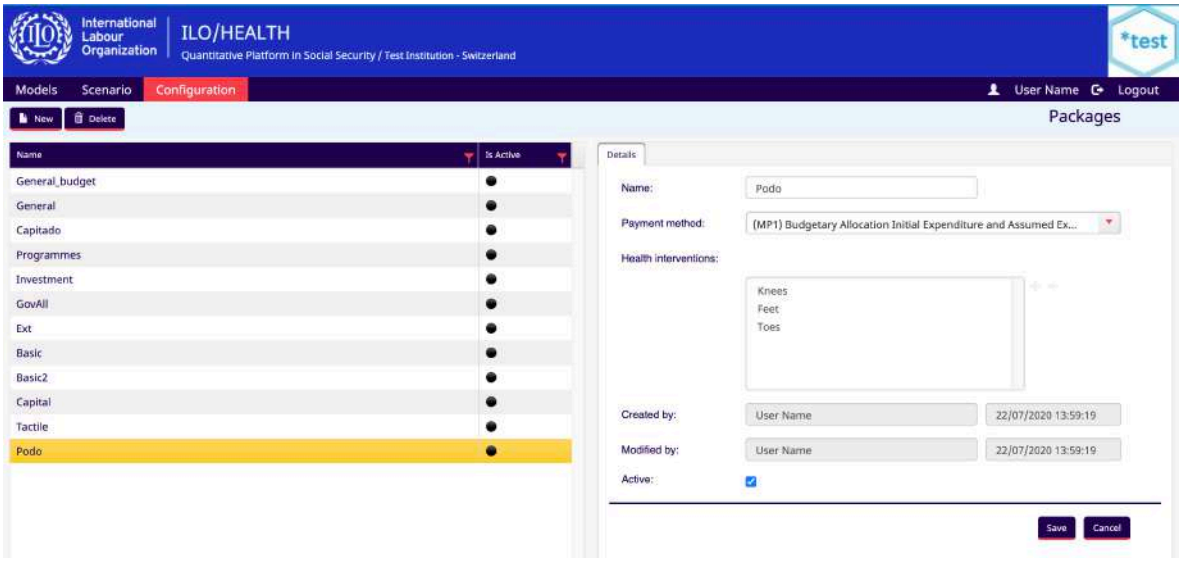




➔ Repeat, following the table below (add interventions if needed):

Name	Payment Method	Interventions
Tactile	(MP6) By health intervention hospitalization	Fingers and Hands
Podo	(MP1) Budgetary Allocation Initial Expenditure and Assumed Expenditure Growth	Knees, Feet and Toes
Umbilical	(MP4) Capitation	Bellybutton
Infrastructure	(MP3) Budgetary Allocation Expenditure as a percentage of GEX	Main_building
BT	(MP2) Budgetary Allocation Expenditure as a percentage of GDP	Hospital


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
New
Delete
Packages
Name
Is Active
General_budget
General
Capitado
Programmes
Investment
GovAll
Ext
Basic
Basic2
Capital
Tactile
Podo
Details
Name:
Tactile
Payment method:
(MP6) By health intervention hospitalization
Health interventions:
Fingers
Hands
Created by:
User Name
22/07/2020 13:56:05
Modified by:
User Name
22/07/2020 13:56:05
Active:
Save
Cancel


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
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User Name
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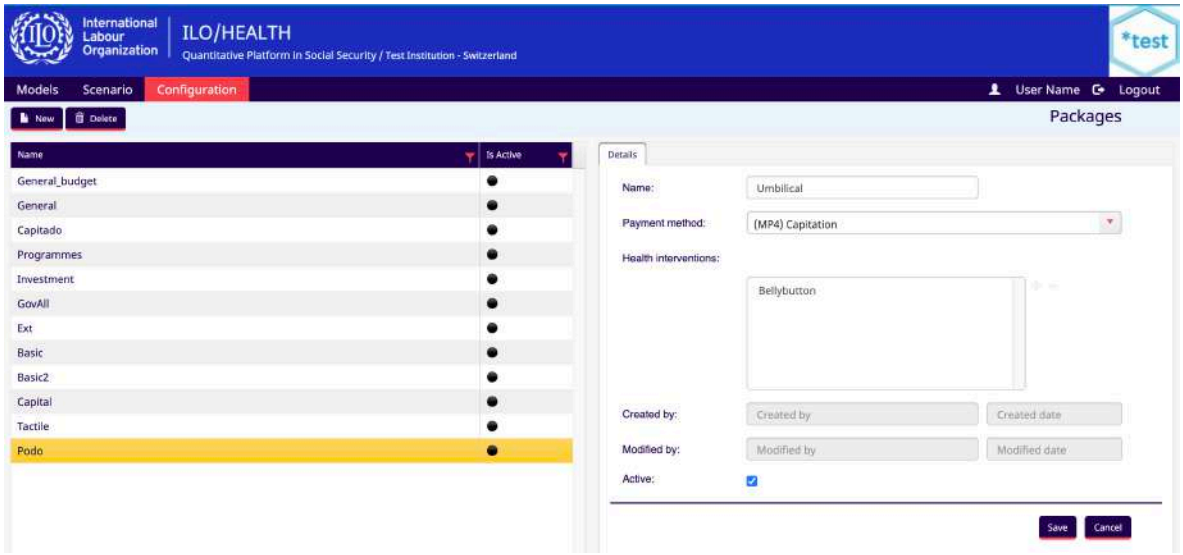
Delete
Packages
Name
Is Active
General_budget
General
Capitado
Programmes
Investment
GovAll
Ext
Basic
Basic2
Capital
Tactile
Podo
Details
Name:
Podo
Payment method:
(MP1) Budgetary Allocation Initial Expenditure and Assumed Ex...
Health interventions:
Knees
Feet
Toes
Created by:
User Name
22/07/2020 13:59:19
Modified by:
User Name
22/07/2020 13:59:19
Active:
Save
Cancel


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
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Is Active
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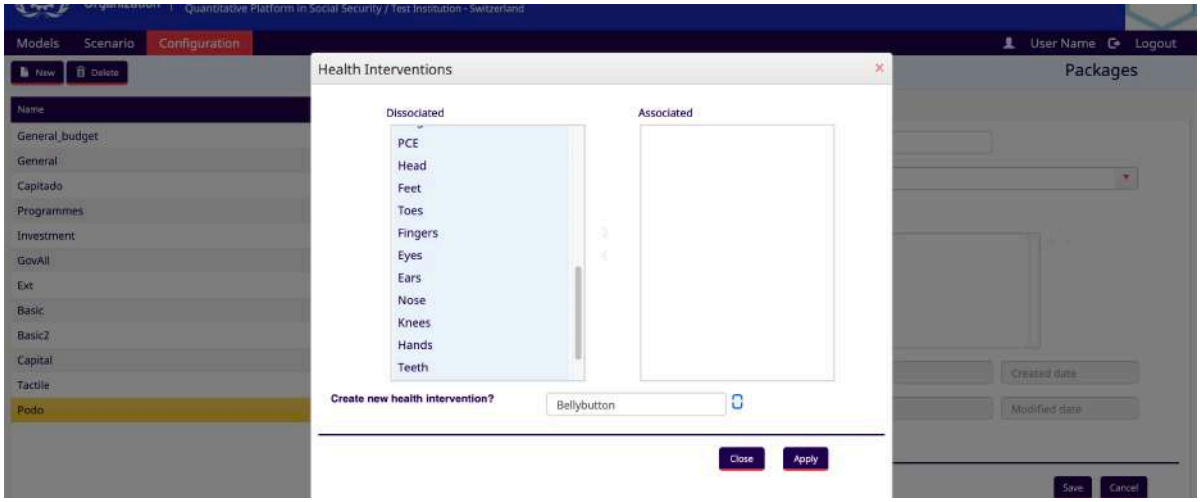
Capitado
Programmes
Investment
GovAll
Ext
Basic
Basic2
Capital
Tactile
Podo
Details
Name:
Umbilical
Payment method:
(MP4) Capitation
Health interventions:
Bellybutton
Created by:
Created by
Created date
Modified by:
Modified by
Modified date
Active:
Save
Cancel


Models
Scenario
Configuration
User Name
Logout
New
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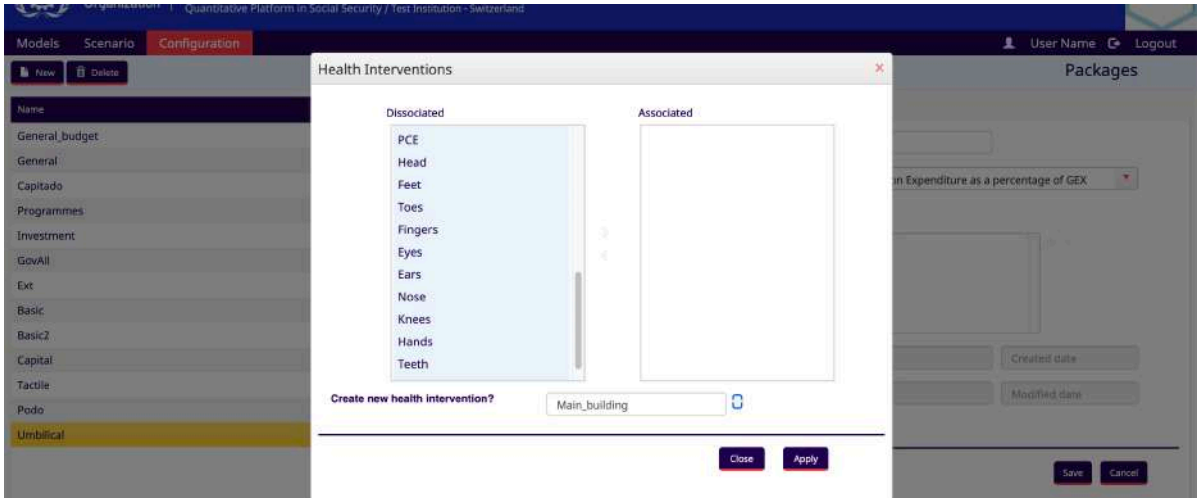
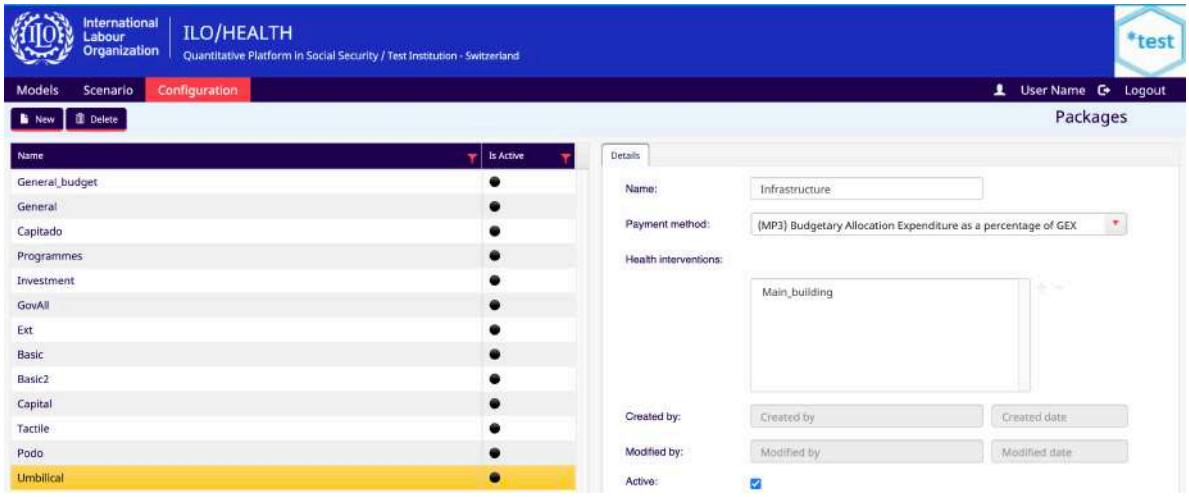
Packages
Health Interventions
Dissociated
Associated
PCE
Head
Feet
Toes
Fingers
Eyes
Ears
Nose
Knees
Hands
Teeth
Create new health intervention?
Bellybutton
Close
Apply
Save
Cancel


Models
Scenario
Configuration
User Name
Logout
New
Delete
Packages
Health Interventions
Dissociated
Associated
PCE
Head
Feet
Toes
Fingers
Eyes
Ears
Nose
Knees
Hands
Teeth
Create new health intervention?
Main_building
Close
Apply
Save
Cancel


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
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User Name
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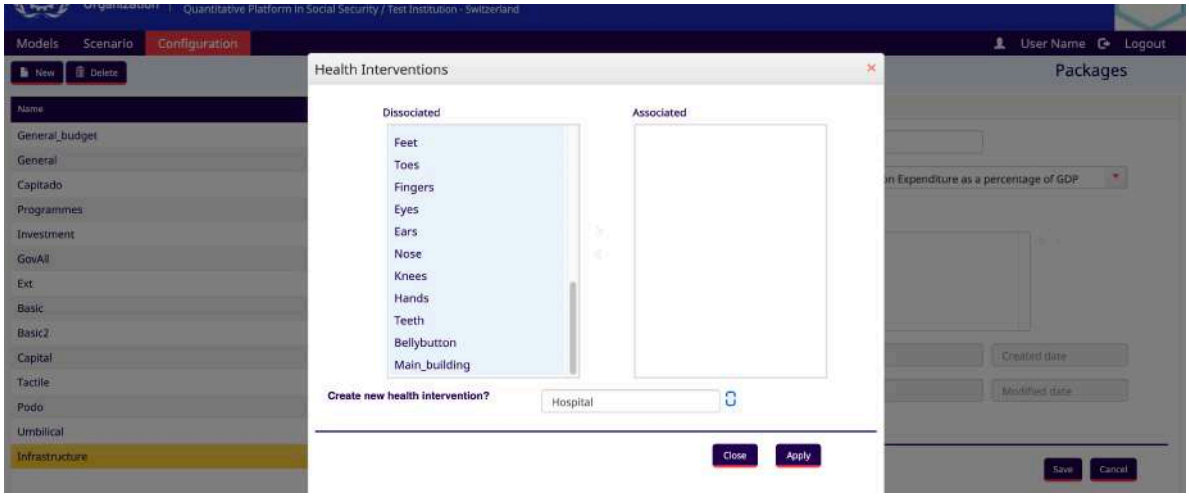
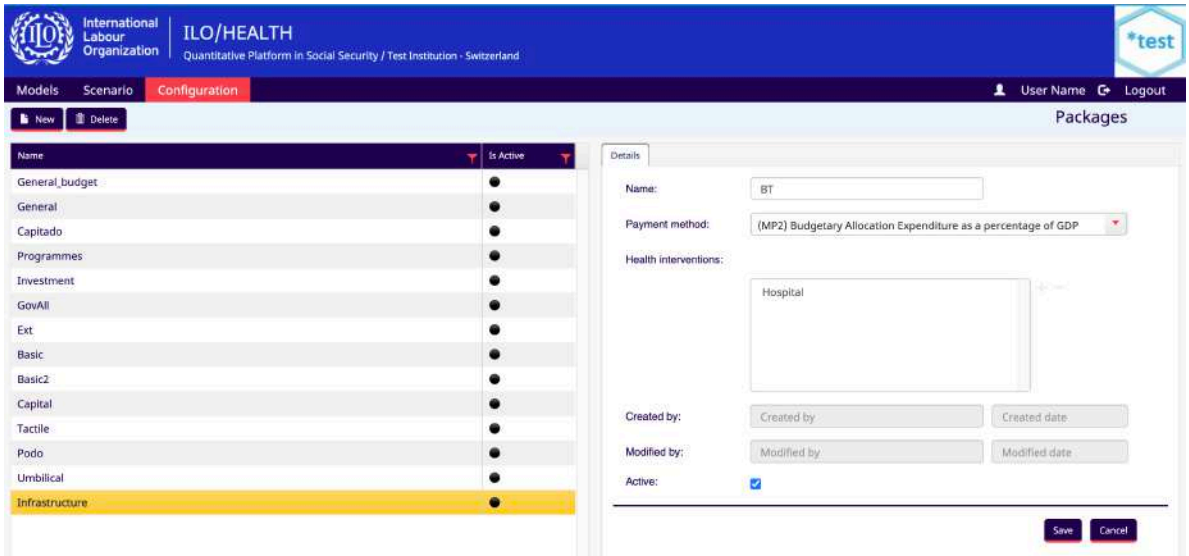
Packages
Name
Is Active
General_budget
General
Capitado
Programmes
Investment
GovAll
Ext
Basic
Basic2
Capital
Tactile
Podo
Umbilical
Details
Name:
Infrastructure
Payment method:
(MP3) Budgetary Allocation Expenditure as a percentage of GEX
Health interventions:
Main_building
Created by:
Created by
Created date
Modified by:
Modified by
Modified date
Active:


Health Interventions
Dissociated
Associated
Feet
Toes
Fingers
Eyes
Ears
Nose
Knees
Hands
Teeth
Bellybutton
Main_building
Create new health intervention?
Hospital
Close
Apply
Packages
Save
Cancel


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
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Configuration
User Name
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New
Delete
Packages
Name
Is Active
General_budget
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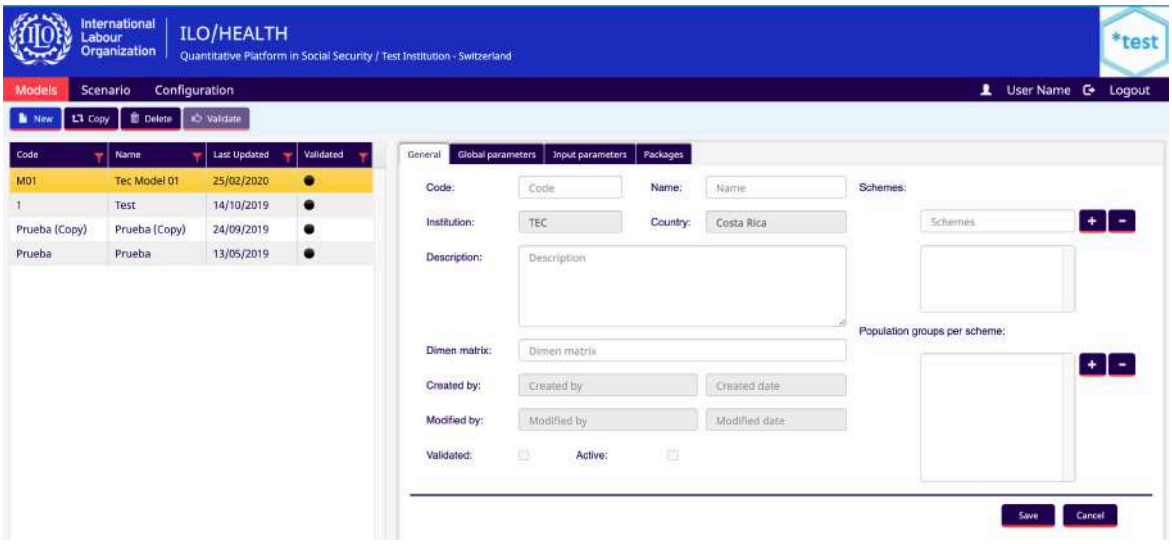
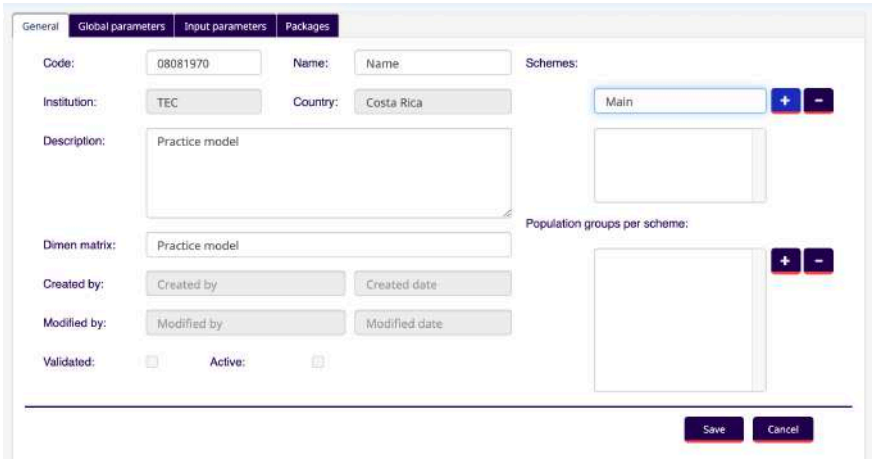
Capitado
Programmes
Investment
GovAll
Ext
Basic
Basic2
Capital
Tactile
Podo
Umbilical
Infrastructure
Details
Name:
BT
Payment method:
(MP2) Budgetary Allocation Expenditure as a percentage of GDP
Health interventions:
Hospital
Created by:
Created by
Created date
Modified by:
Modified by
Modified date
Active:
Save
Cancel

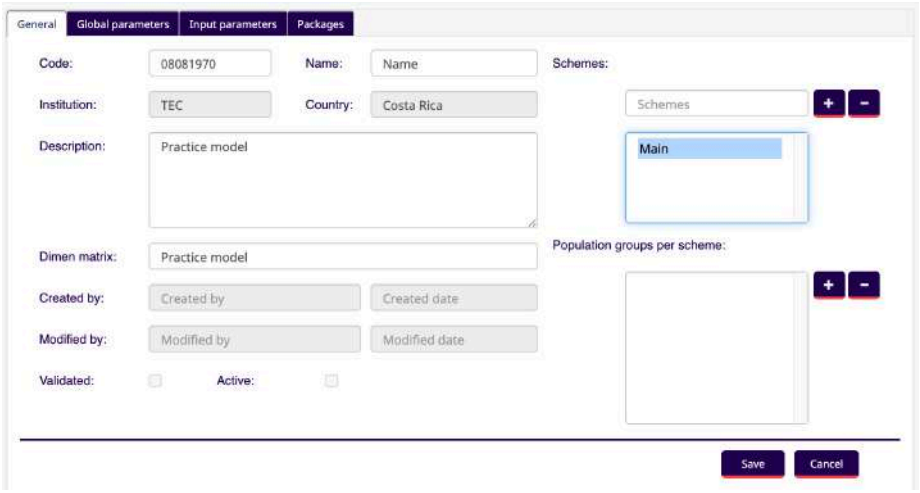
6.1.3. Create a practice model

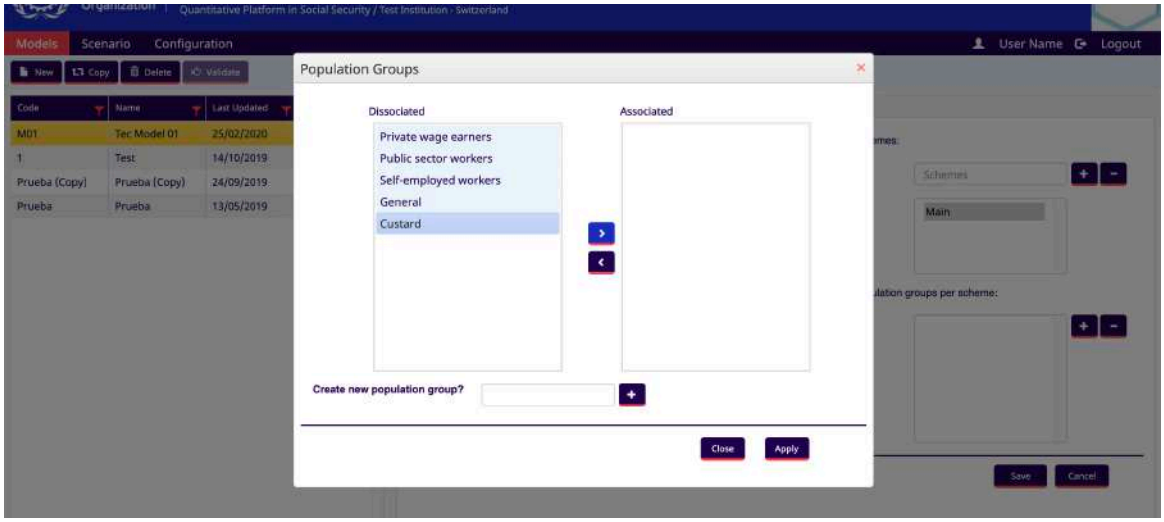
In ILO/HEALTH, users can explore existing models and scenarios. For this trial run, they should avoid modifying existing work done. To begin:

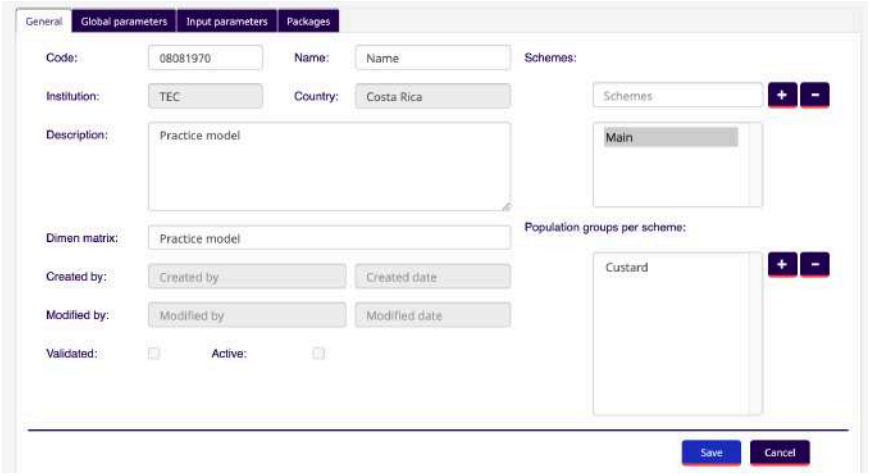
- ➔ Select Models in the main menu, then in the Models menu that appears, select New.
- ➔ Create a new model in the Model window as follows: input user's birthdate in the Code and name in the Name. In the description, enter 'Practice model'.
- ➔ Add one scheme named Main with a population group selected from the list of available ones (created in the previous step).
- ➔ To enter a population group, type Main in the box labelled Schemes, then press the plus sign. Once Main appears in the box below, select it and press the plus sign under population groups per scheme to enable selection of population groups.
- ➔ Save changes, select OK when the model is successfully inserted (see green validation box for reference) and go to the Global Parameters tab.



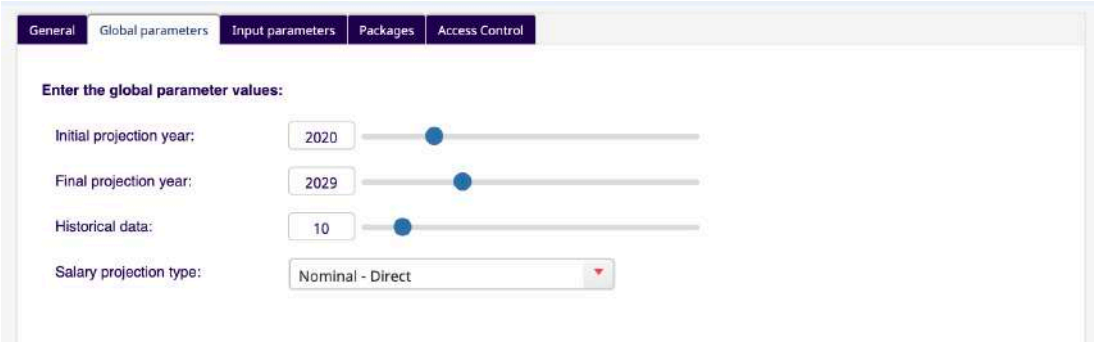




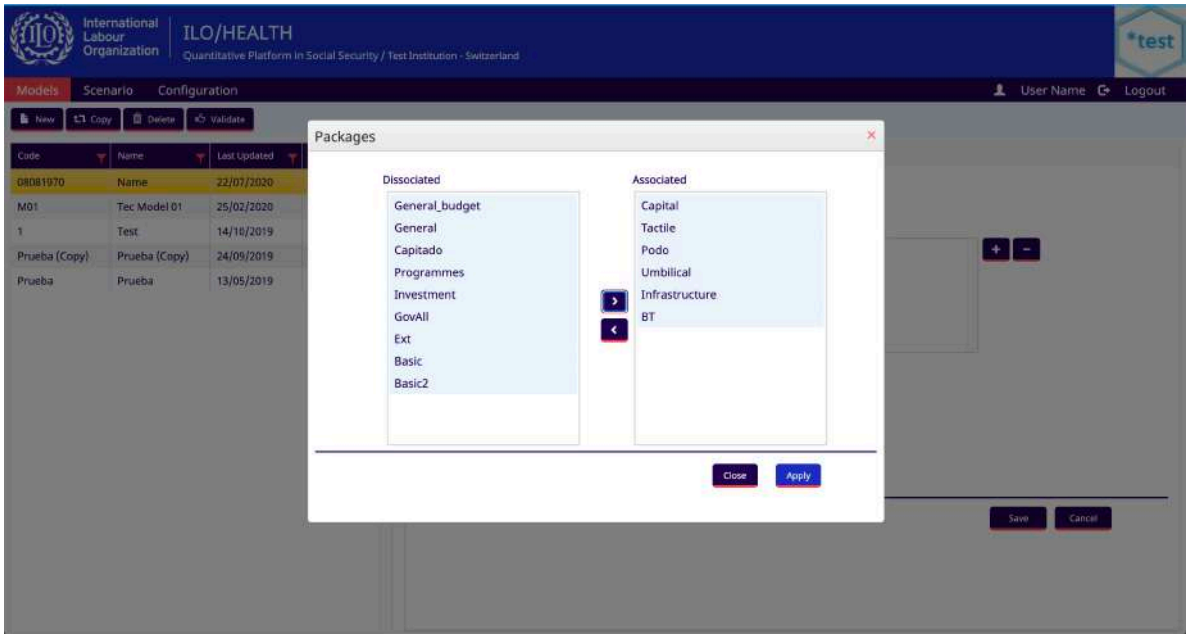




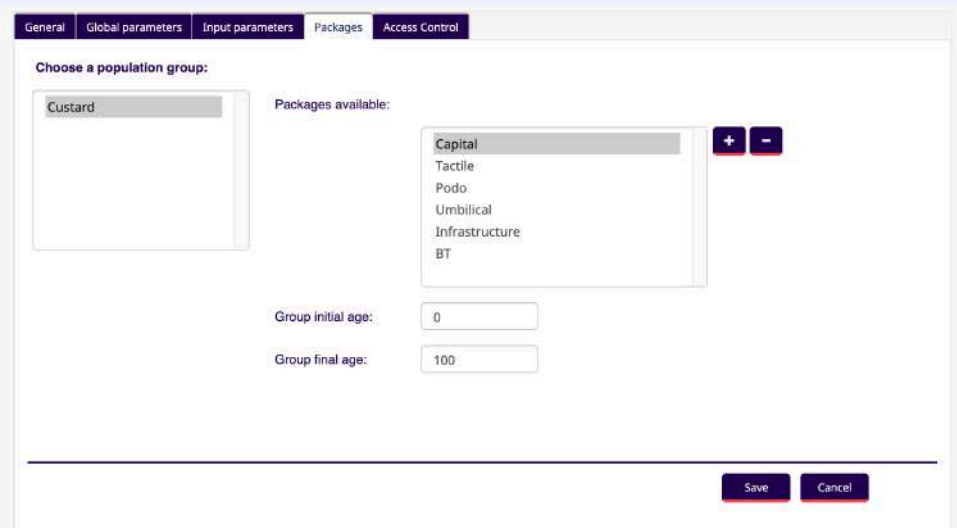
➔ In the Global Parameters tab, create a 10-year projection period (last year of projection is nine years after the first projection year) and keep the default at 10 years of historical data. Select the Nominal-Direct option for the Salary projection type, and press Save to save the parameters.



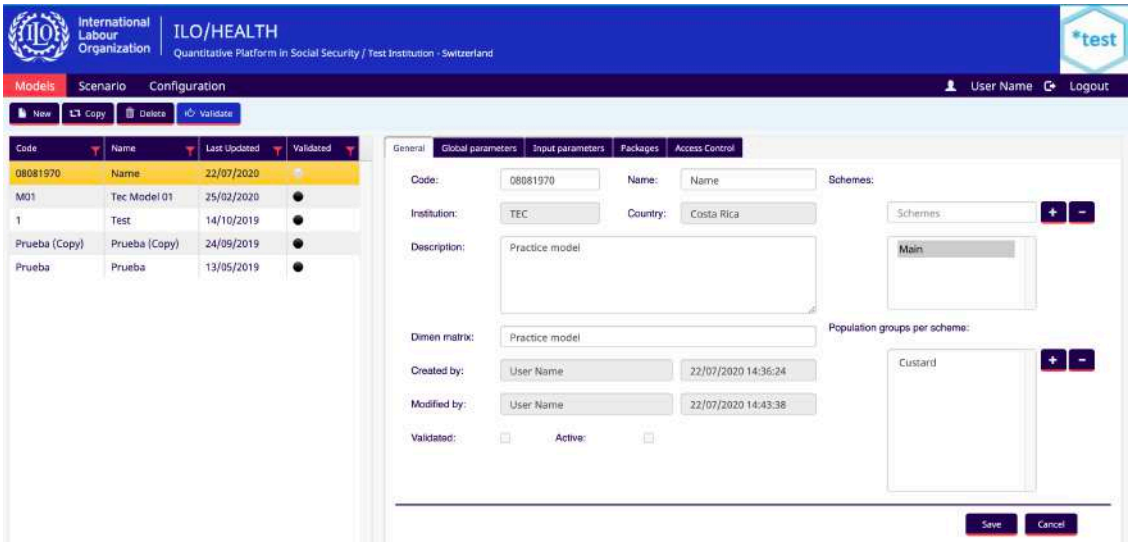
➔ Users should then go to the Input Parameters tab and in the only scheme available, choose a lifespan of 100, with active ages from 15 to 69 and save the parameters.

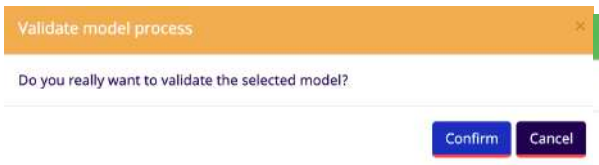


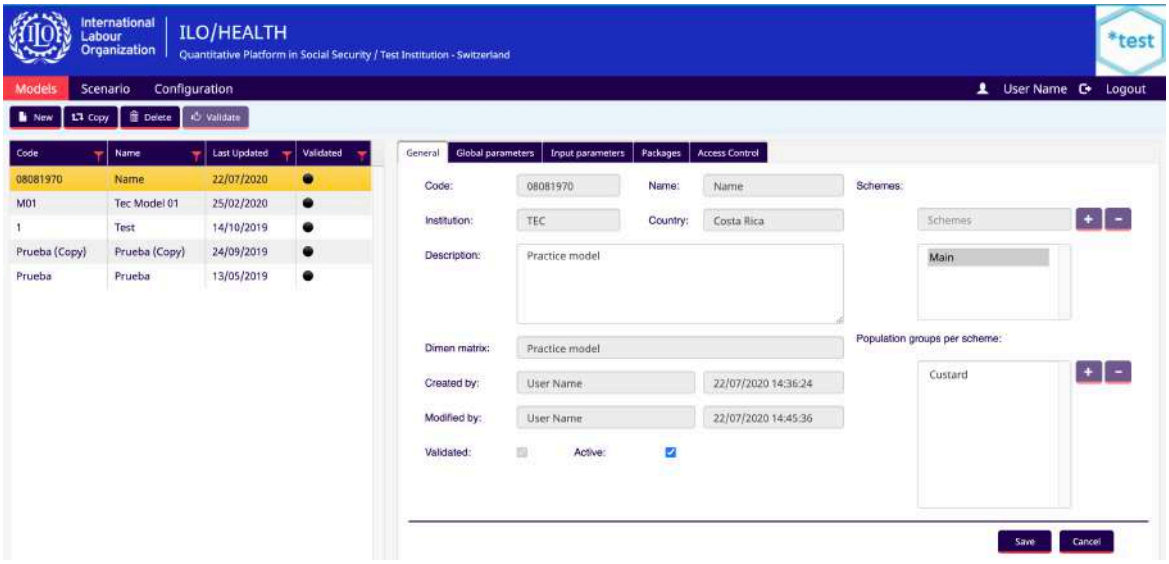
➔ They should then go to the Packages tab and select the only Population group available. Select the plus sign and add the packages created during the previous steps one by one. For each package, they should input the group's minimum and maximum ages at 0 and 100, respectively, and then select Save.



➔ To validate the model, select the model name in the menu (if it is not already selected) and select the Validate tab in the Models menu (above the models). Then, choose Validate and press OK in the green pop-up box that confirms that the model has been successfully validated.



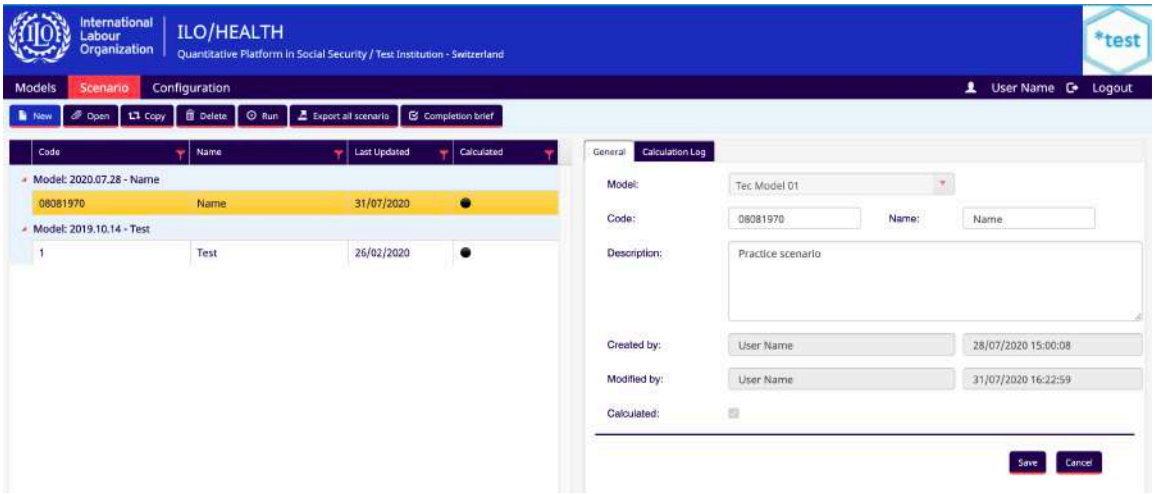


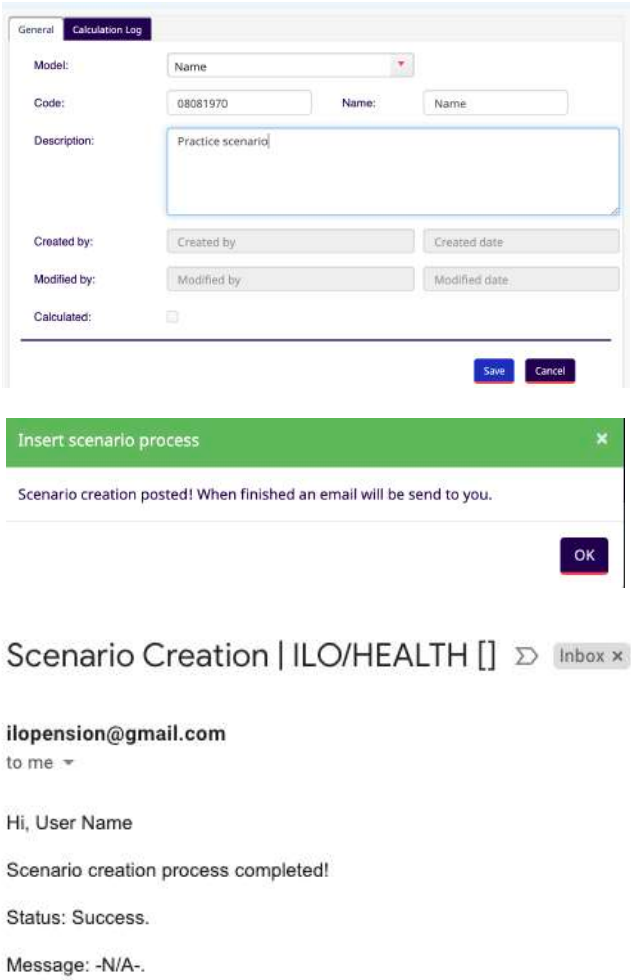


6.1.4. Create a practice scenario

➔ To create a practice scenario, select Scenario in the main menu, and New in the Scenario menu. In the dropdown Models menu, choose the model with their name, fill in the code with the user's birthdate, use their name for Name and use 'Practice scenario' as the description. Then select Save and OK.

➔ Users should then log in to the email used for registration and wait for a message that the model was successfully created. This will take a few minutes as ILO/HEALTH is assigning space for all the matrices required for the model.





6.2. Opening the scenario and filling in a set of matrices

For this practice run, the idea is to fill in as few matrices as possible to still be able to run the model. The objectives is to learn:

- tricks for filling in matrices;
- how to assess progress;
- how to run a scenario;
- how to navigate output matrices; and
- how to copy the scenario to create an alternative one.

For this exercise, all matrices in a new model will contain zeros. This facilitates the exercise. Although it is not a common practice, it is the way users will model a new scheme. Users may choose

to skip all the matrices, but the recommended practice is to check out and check in the matrices to ensure that the Completion brief shows an increase in the completion rate.

Also, where applicable, users should remember to perform each step for both sexes. A convenient way to check progress is to see if the Completion brief reads 100 per cent completed for all matrices. When a matrix reads 0 per cent completed in the Completion brief it means that the matrix has not been Checked Out or Checked In. When a matrix reads 50 per cent completed, the matrix needs to be filled out for both sexes.

See the example for [Iact] below.

6.2.1. Filling in the contributor information

The demographic data for the previous year is key information for a running scheme because it reports the number of each type of beneficiary by sex and age, demonstrating the exposure of those populations to the risk of continuing to require benefits. The number of active and inactive contributors, by age, sex and accumulated contributions, shows the exposure to contingencies as a contribution payment or benefit demand. Basically, the section on demographic data for the base year introduces to the model all the information in section 4.1.

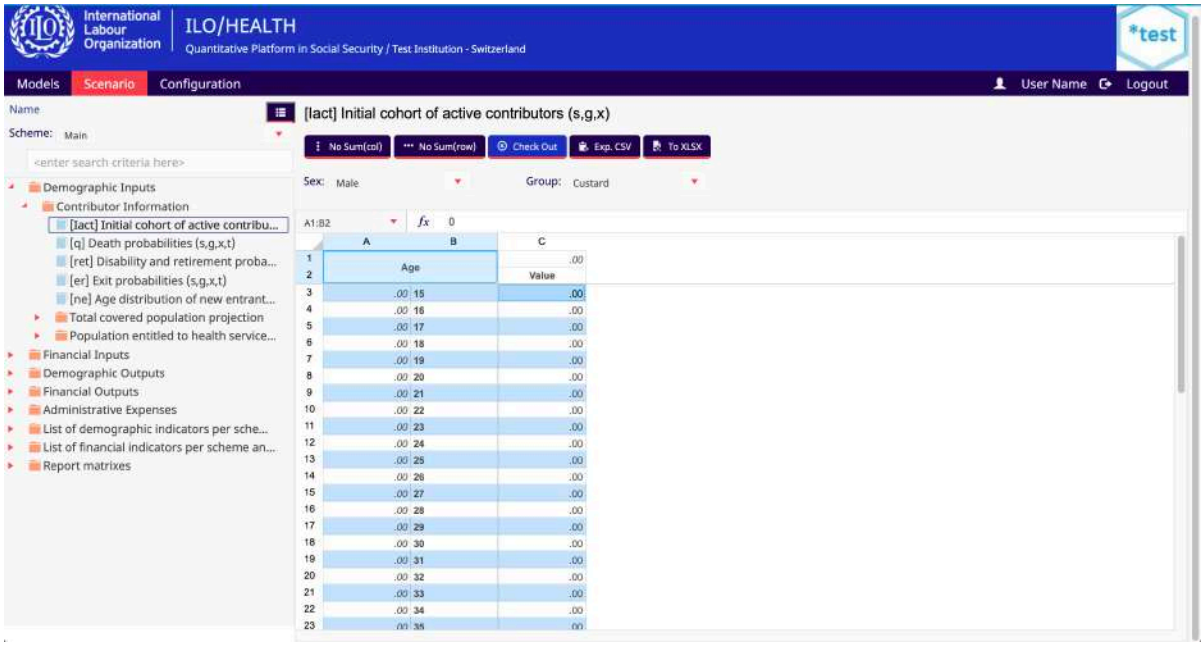
Located under Inputs > Contributors, the Contributors folder contains information on contributors' characteristics and transition probabilities. It also has two sub-folders with matrices that project, (a) the total covered population, and (b) the population entitled to healthcare services.

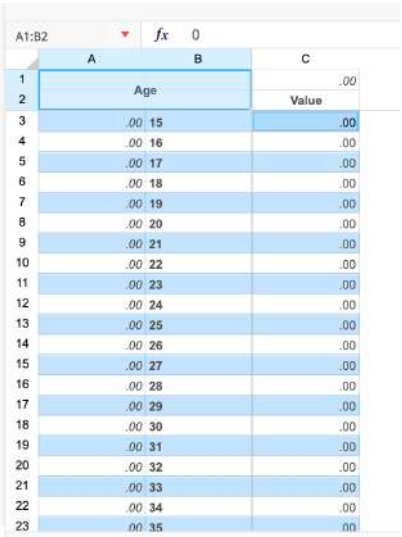
The Contributors folder has five matrices: Initial cohort of active contributors [Iact], Probabilities of death [q], Disability and retirement probabilities [ret], Exit probabilities [er], and Age distribution of new entrants [ne].

6.2.1.1. *Initial cohort of active contributors*

For this exercise, [Iact] can be kept at 0, but users need to complete the following exercise to increase the completion rate of the scenario. To do this, users should:

- ➔ Check out and check in the matrix for males, then check the Completion brief to verify what happens when a matrix is filled out for one sex only. (Tip: If Iact does not appear at the top, sort by "Completeness" by clicking on the red filter icon next to it to bring completed matrices to the top of the list.)
- ➔ Users should fill out the matrix for females and check the Completion brief again.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
<enter search criteria here>
Demographic Inputs
Contributor Information
[Iact] Initial cohort of active contribu...
[q] Death probabilities (s,g,x,t)
[ret] Disability and retirement proba...
[er] Exit probabilities (s,g,x,t)
[ne] Age distribution of new entrant...
Total covered population projection
Population entitled to health service...
Financial Inputs
Demographic Outputs
Financial Outputs
Administrative Expenses
List of demographic indicators per sche...
List of financial indicators per scheme an...
Report matrixes
[Iact] Initial cohort of active contributors (s,g,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0
Age
Value


A1:B2
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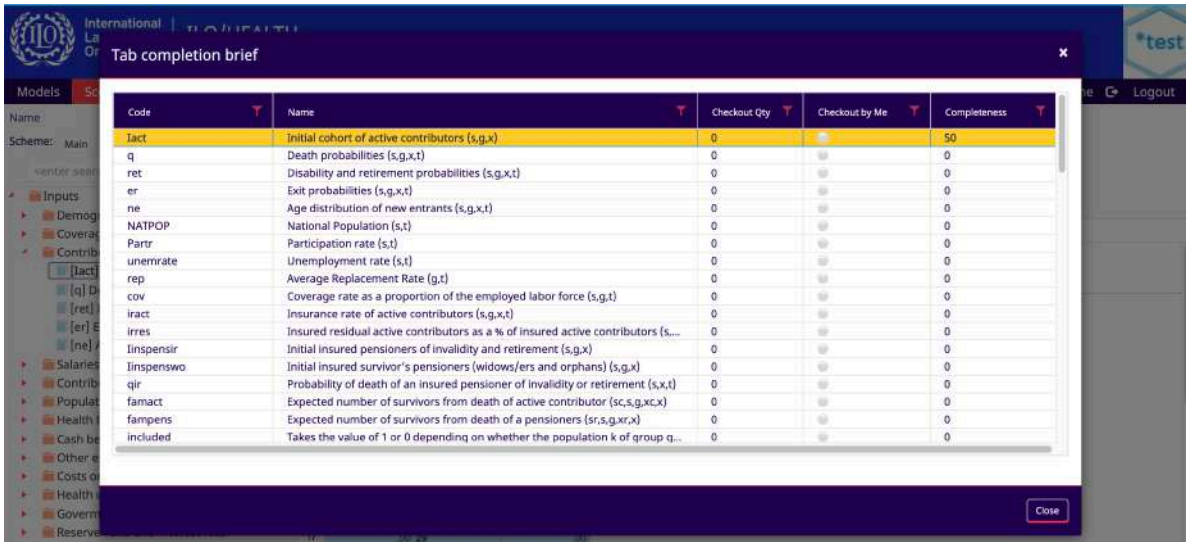
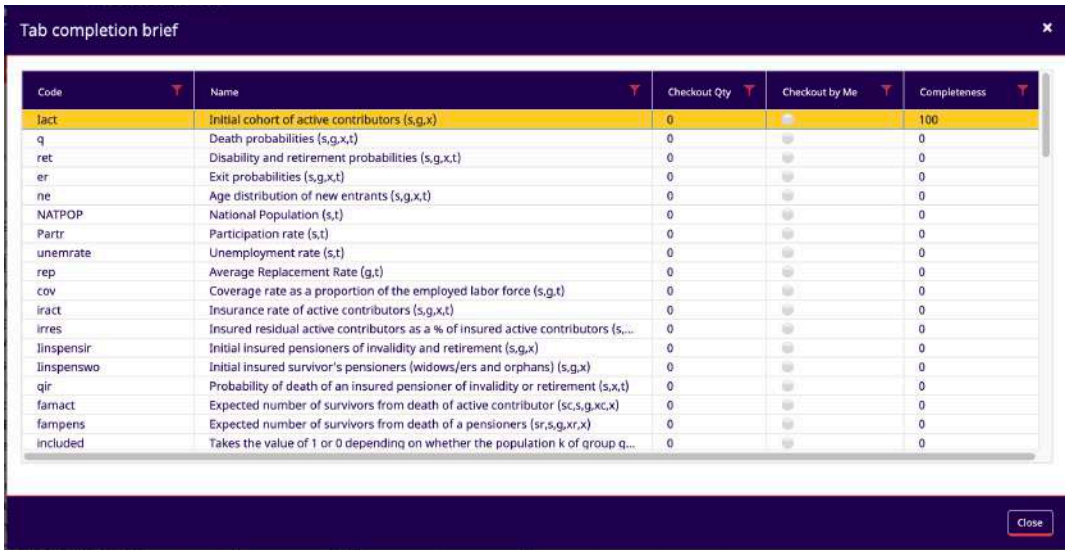




6.2.1.2. *Probabilities of death (Mortality)*

The main and most common transition probabilities for any healthcare scheme correspond to mortality. The mortality tables in all scenarios have two dimensions: time and age. ILO/HEALTH will alert users if the tables have any negative values or death probabilities greater than 100 per cent. It is expected that the probability of death at the maximum age is 100 per cent. Where mortality does not reach 100 per cent, there is no effect as all survivors up to this age will exceed the maximum age limits of the model, thus technically applying a 100 per cent death probability.[29]

[29] For the example, the mortality of active contributors is calculated as follows:

- $q(x) = 0.098\left[1 - \frac{ln(1+(0.8+t*0.001)x)}{ln(80+0.1t)}\right] + e^{(12+0.06t)\left(\frac{x}{100}-1\right)}$ for male
- $q(x) = 0.089\left[1 - \frac{ln(1+(0.7+0.001t)x}{ln(70+0.1t)}\right] + e^{\left(\frac{x}{100}-1\right)(14+0.05t)}$ for female

For most matrices in this section, users will learn a simple trick to export and import matrices so they can work on them in external programmes. This consists of selecting the matrix, exporting it as a csv file, modifying it in an external programme and then importing the csv file.

➔ Select the matrix [q] and export the csv using “Exp. CSV”. Once the csv has downloaded, open it and save it as “mort_male.csv” in a folder that reserved for files of the model.

➔ Open the file and go to cell C2. In the formulas menu (or right click menu), select “Define name”, and name the cell as Base_y. In cell C3, write the following formula:

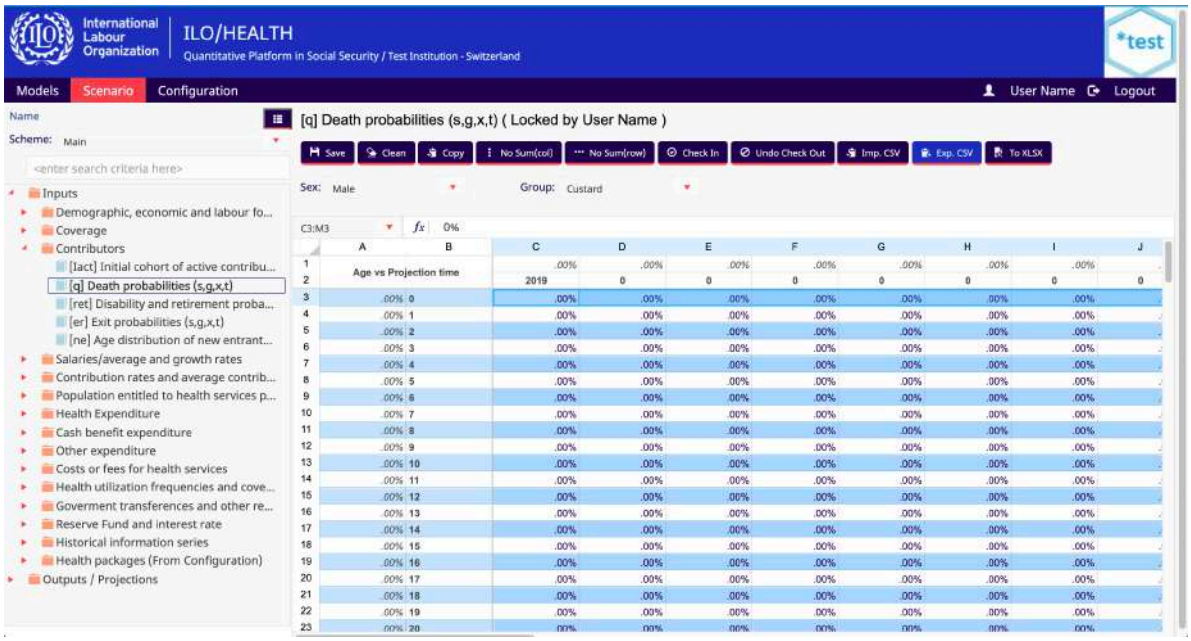
=0.098*(1-LN(1+(0.8+(C$2-Base_y)*0.001)*$B3)/LN(80+(C$2-Base_y)*0.1))
+EXP((12+(C$2-Base_y)*0.06)*($B3/100-1))

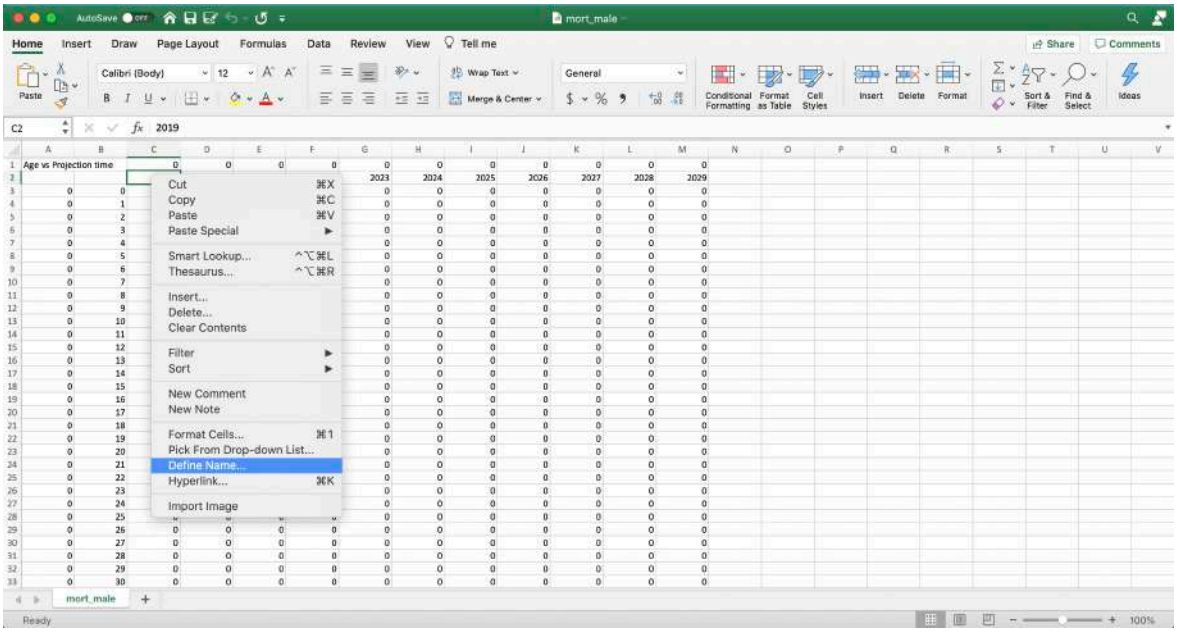
➔ Copy the formula into all cells of the worksheet that read 0 and save the work as a csv file. Although the programme may alert users of a potential loss of information, the csv format should still be used in this case.

➔ Copy the formula in all cells of the worksheet that read 0. Save the workbook. Close Excel.

➔ To import these files back into ILO/HEALTH, go to matrix [q] and check that it says “Male” in the dropdown menu above. Then, check out, import csv, find the saved folder and select the file “mort_male.csv”. When the green dialog box confirming that the matrix tab was imported appears, check to see that the file worked on was correctly transferred to ILO/HEALTH. Check in.

➔ Check the Completion brief.




mort_male
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Share Comments
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Merge & Center
Conditional Formatting
Format as Table
Cell Styles
Insert
Delete
Format
Sort & Filter
Find & Select
Ideas
C2
2019
Age vs Projection time
Cut ⌘X
Copy ⌘C
Paste ⌘V
Paste Special
Smart Lookup... ^⌥⌘L
Thesaurus... ^⌥⌘R
Insert...
Delete...
Clear Contents
Filter
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New Comment
New Note
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Define Name...
Hyperlink... ⌘K
Import Image
mort_male
Ready
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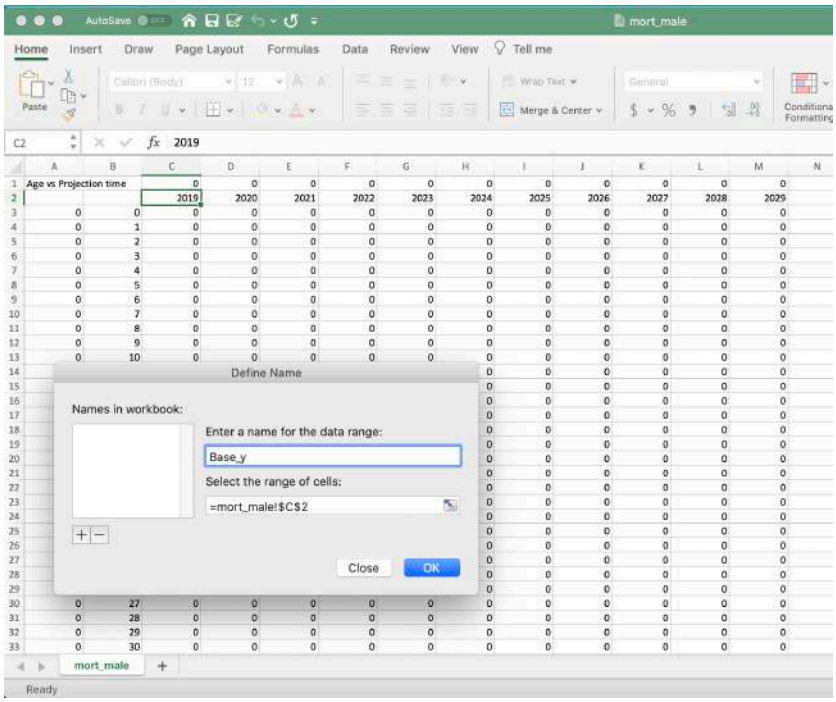
mort_male
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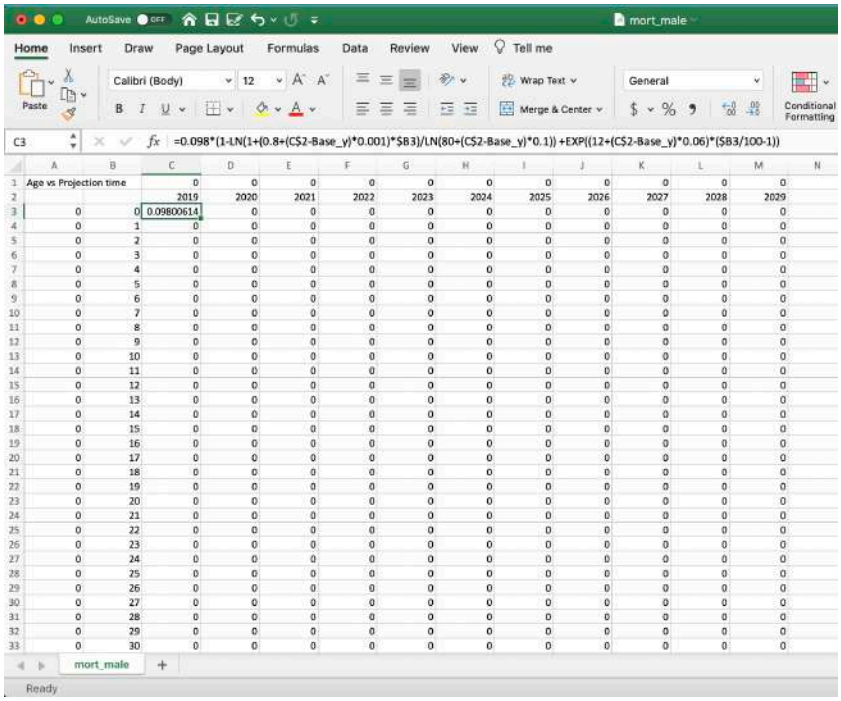
C2
2019
Age vs Projection time
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029
Define Name
Names in workbook:
Enter a name for the data range:
Base_y
Select the range of cells:
=mort_male!C2
Close
OK
mort_male
Ready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Merge & Center
Conditional Formatting
C3
=0.098*(1-LN(1+(0.8+(C$2-Base_y)*0.001)*$B3)/LN(80+(C$2-Base_y)*0.1)) +EXP((12+(C$2-Base_y)*0.06)*($B3/100-1))
Age vs Projection time
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029
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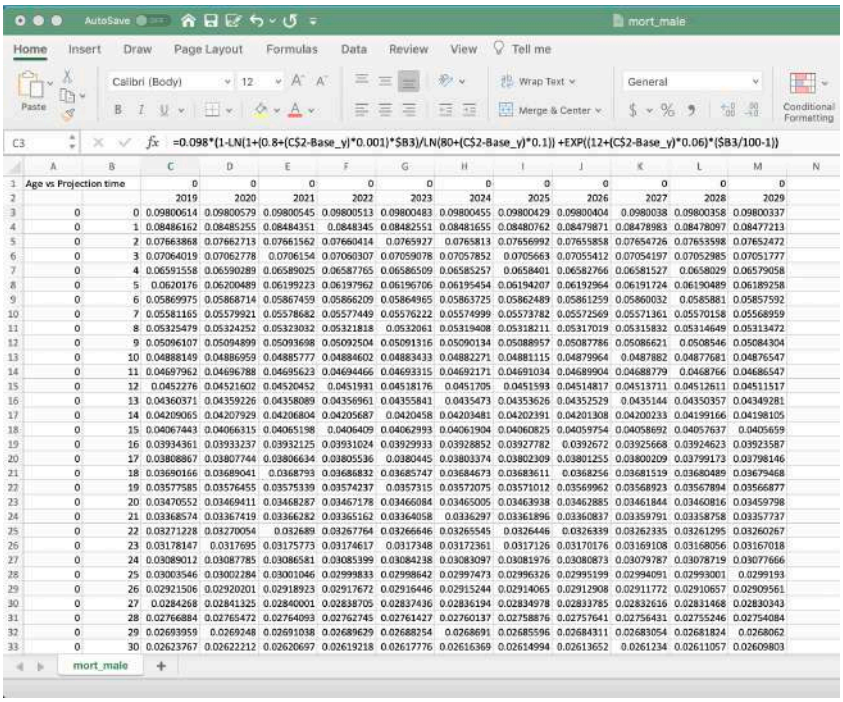
mort_male
Ready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Home Insert Draw Page Layout Formulas Data Review View Tell me
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Merge & Center
Conditional Formatting
C3
=0.098*(1-LN(1+(0.8+(C$2-Base_y)*0.001)*$B3)/LN(80+(C$2-Base_y)*0.1)) +EXP((12+(C$2-Base_y)*0.06)*($B3/100-1))
Age vs Projection time
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029
0 0 0.09800614 0.09800579 0.09800545 0.09800513 0.09800483 0.09800455 0.09800429 0.09800404 0.0980038 0.09800358 0.09800337
0 1 0.08486162 0.08485255 0.08484351 0.0848345 0.08482551 0.08481655 0.08480762 0.08479871 0.08478983 0.08478097 0.08477213
0 2 0.07663868 0.07662713 0.07661562 0.07660414 0.0765927 0.0765813 0.07656992 0.07655858 0.07654726 0.07653598 0.07652472
0 3 0.07064019 0.07062778 0.0706154 0.07060307 0.07059078 0.07057852 0.0705663 0.07055412 0.07054197 0.07052985 0.07051777
0 4 0.06591558 0.06590289 0.06589025 0.06587765 0.06586509 0.06585257 0.0658401 0.06582766 0.06581527 0.0658029 0.06579058
0 5 0.0620176 0.06200489 0.06199223 0.06197962 0.06196706 0.06195454 0.06194207 0.06192964 0.06191724 0.06190489 0.06189258
0 6 0.05869975 0.05868714 0.05867459 0.05866209 0.05864965 0.05863725 0.05862489 0.05861259 0.05860032 0.0585881 0.05857592
0 7 0.05581165 0.05579921 0.05578682 0.05577449 0.05576222 0.05574999 0.05573782 0.05572569 0.05571361 0.05570158 0.05568959
0 8 0.05325479 0.05324252 0.05323032 0.05321818 0.0532061 0.05319408 0.05318211 0.05317019 0.05315832 0.05314649 0.05313472
0 9 0.05096107 0.05094899 0.05093698 0.05092504 0.05091316 0.05090134 0.05088957 0.05087786 0.05086621 0.0508546 0.05084304
0 10 0.04888149 0.04886959 0.04885777 0.04884602 0.04883433 0.04882271 0.04881115 0.04879964 0.0487882 0.04877681 0.04876547
0 11 0.04697962 0.04696788 0.04695623 0.04694466 0.04693315 0.04692171 0.04691034 0.04689904 0.04688779 0.0468766 0.04686547
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0 13 0.04360371 0.04359226 0.04358089 0.04356961 0.04355841 0.0435473 0.04353626 0.04352529 0.0435144 0.04350357 0.04349281
0 14 0.04209065 0.04207929 0.04206804 0.04205687 0.04204578 0.04203481 0.04202391 0.04201308 0.04200233 0.04199166 0.04198105
0 15 0.04067443 0.04066315 0.04065198 0.0406409 0.04062993 0.04061904 0.04060825 0.04059754 0.04058692 0.04057637 0.0405659
0 16 0.03934361 0.03933237 0.03932125 0.03931024 0.03929933 0.03928852 0.03927782 0.0392672 0.03925668 0.03924623 0.03923587
0 17 0.03808867 0.03807744 0.03806634 0.03805536 0.0380445 0.03803374 0.03802309 0.03801255 0.03800209 0.03799173 0.03798146
0 18 0.03690166 0.03689041 0.0368793 0.03686832 0.03685747 0.03684673 0.03683611 0.0368256 0.03681519 0.03680489 0.03679468
0 19 0.03577585 0.03576455 0.03575339 0.03574237 0.0357315 0.03572075 0.03571012 0.03569962 0.03568923 0.03567894 0.03566877
0 20 0.03470552 0.03469411 0.03468287 0.03467178 0.03466084 0.03465005 0.03463938 0.03462885 0.03461844 0.03460816 0.03459798
0 21 0.03368574 0.03367419 0.03366282 0.03365162 0.03364058 0.0336297 0.03361896 0.03360837 0.03359791 0.03358758 0.03357737
0 22 0.03271228 0.03270054 0.032689 0.03267764 0.03266646 0.03265545 0.0326446 0.0326339 0.03262335 0.03261295 0.03260267
0 23 0.03178147 0.0317695 0.03175773 0.03174617 0.0317348 0.03172361 0.0317126 0.03170176 0.03169108 0.03168056 0.03167018
0 24 0.03089012 0.03087785 0.03086581 0.03085399 0.03084238 0.03083097 0.03081976 0.03080873 0.03079787 0.03078719 0.03077666
0 25 0.03003546 0.03002284 0.03001046 0.02999833 0.02998642 0.02997473 0.02996326 0.02995199 0.02994091 0.02993001 0.0299193
0 26 0.02921506 0.02920201 0.02918923 0.02917672 0.02916446 0.02915244 0.02914065 0.02912908 0.02911772 0.02910657 0.02909561
0 27 0.0284268 0.02841325 0.02840001 0.02838705 0.02837436 0.02836194 0.02834978 0.02833785 0.02832616 0.02831468 0.02830343
0 28 0.02766884 0.02765472 0.02764093 0.02762745 0.02761427 0.02760137 0.02758876 0.02757641 0.02756431 0.02755246 0.02754084
0 29 0.02693959 0.0269248 0.02691038 0.02689629 0.02688254 0.0268691 0.02685596 0.02684311 0.02683054 0.02681824 0.0268062
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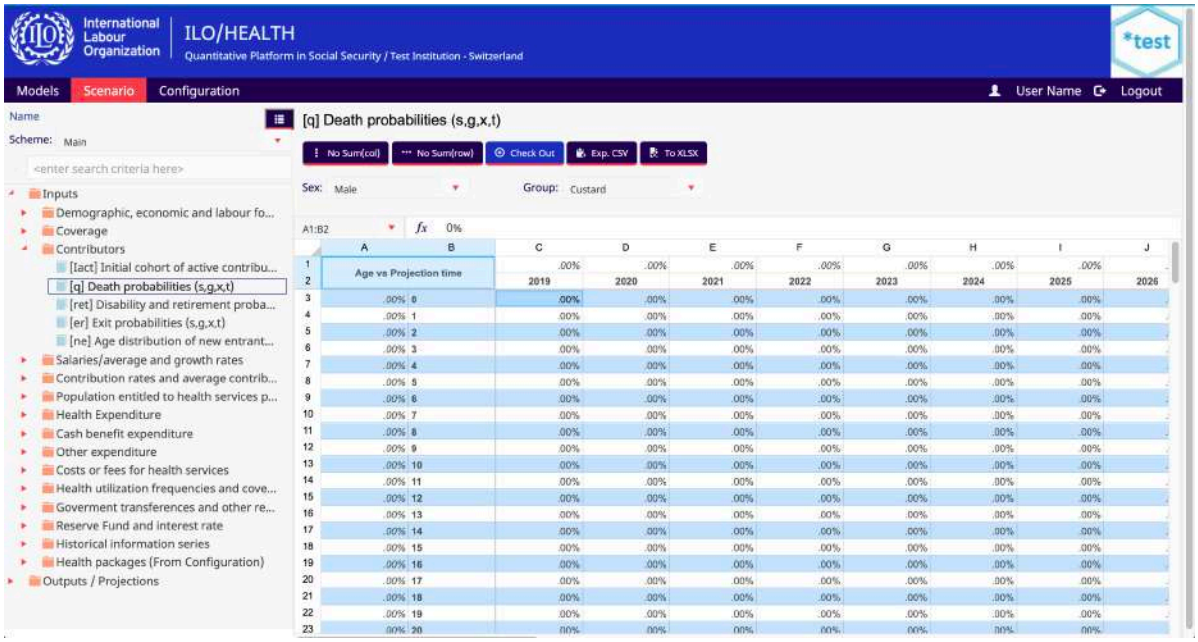
mort_male


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
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Name
Scheme: Main
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Inputs
Demographic, economic and labour fo...
Coverage
Contributors
[Iact] Initial cohort of active contribu...
[q] Death probabilities (s,g,x,t)
[ret] Disability and retirement proba...
[er] Exit probabilities (s,g,x,t)
[ne] Age distribution of new entrant...
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[q] Death probabilities (s,g,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0%
Age vs Projection time
2019
2020
2021
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2024
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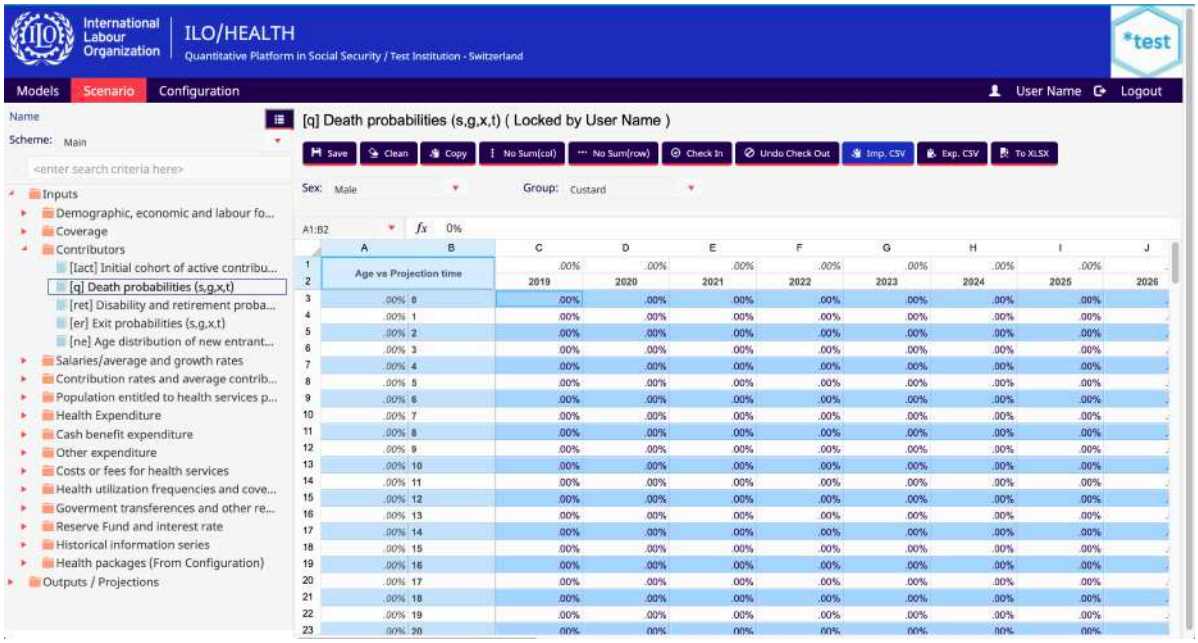
International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
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Scheme: Main
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Inputs
Demographic, economic and labour fo...
Coverage
Contributors
[Iact] Initial cohort of active contribu...
[q] Death probabilities (s,g,x,t)
[ret] Disability and retirement proba...
[er] Exit probabilities (s,g,x,t)
[ne] Age distribution of new entrant...
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[q] Death probabilities (s,g,x,t) (Locked by User Name)
Save
Clean
Copy
No Sum(col)
No Sum(row)
Check In
Undo Check Out
Imp. CSV
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0%
Age vs Projection time
2019
2020
2021
2022
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2024
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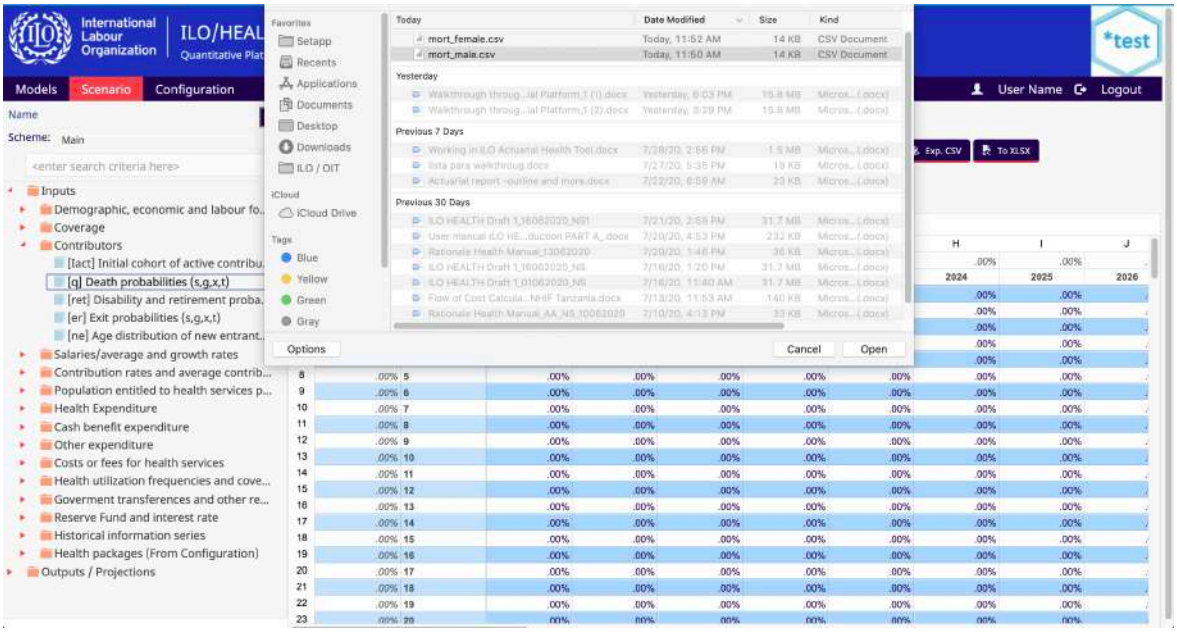
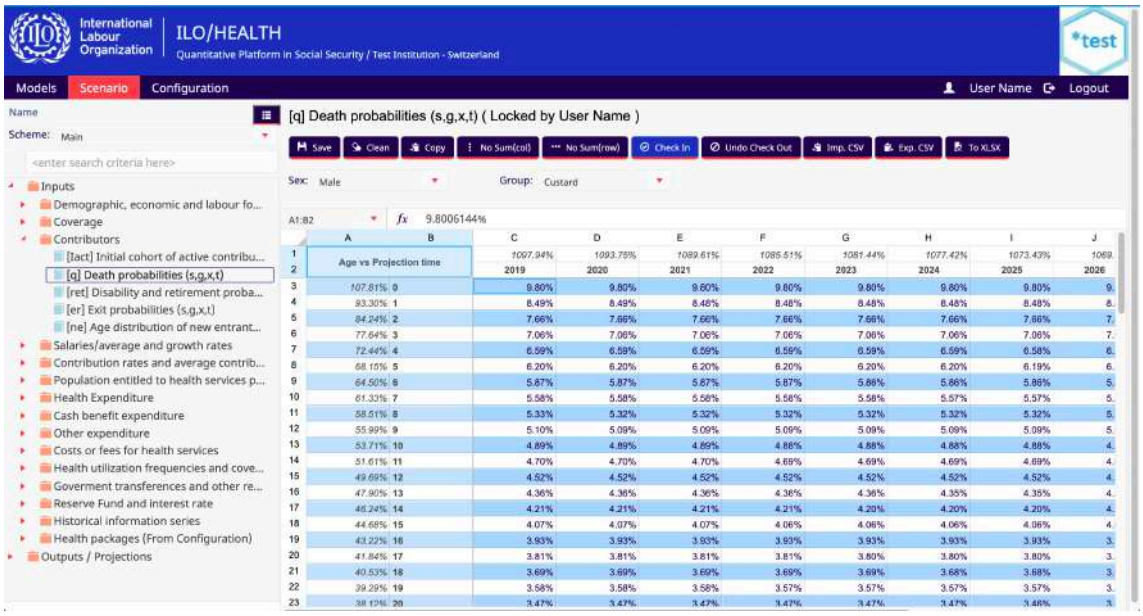
2026





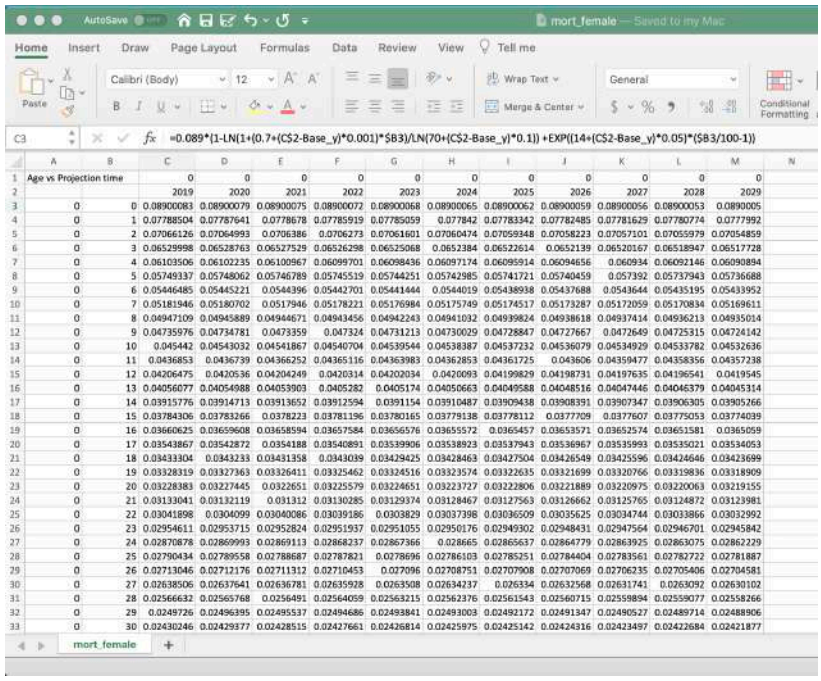
➔ Users should repeat the process for females, click Save As, and save the worksheet as "mort_female.csv". Modify the formula in the cell C3 to become:

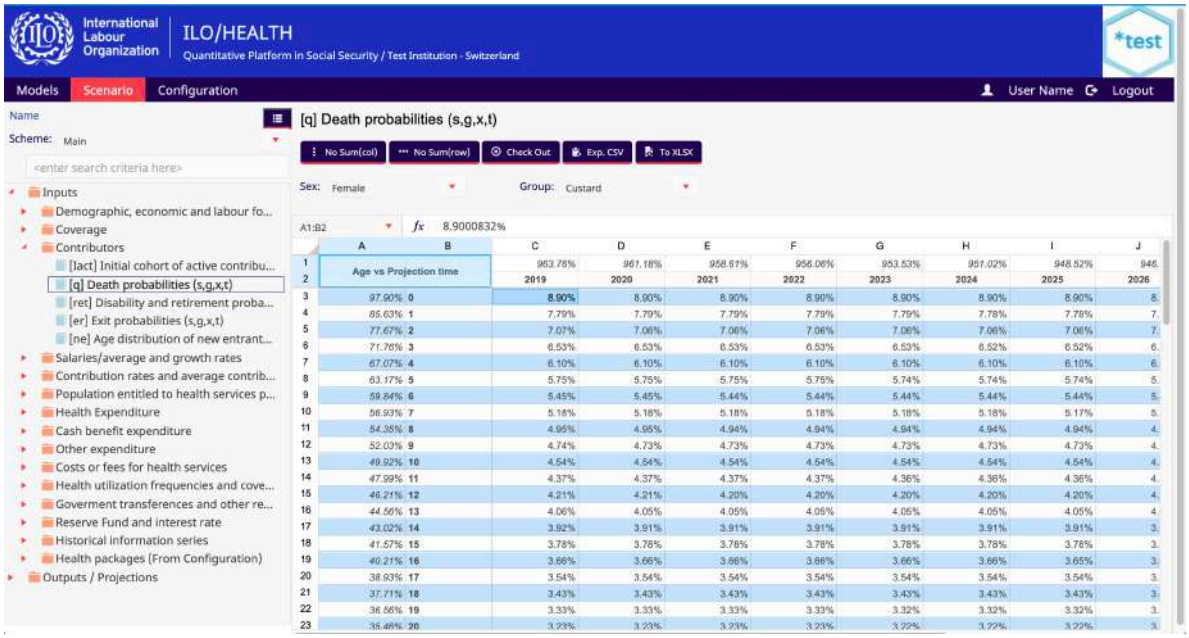
=0.089*(1-LN(1+(0.7+(C$2-Base_y)*0.001)*$B3)/LN(70+(C$2-Base_y)*0.1))
+EXP((14+(C$2-Base_y)*0.05)*($B3/100-1))

➔ Copy it into all cells of the worksheet that read 0. Save the workbook. Close Excel.

➔ To import these back into ILO/HEALTH, go to matrix [q] and check that it says “Female” in the dropdown menu above. Then, check out, import csv, find the saved folder and select the file “mort_female.csv”. When the green dialog box confirming that the matrix tab was imported appears, check to see that the file worked on was correctly transferred to ILO/HEALTH. Check in.

➔ Check the Completion brief.

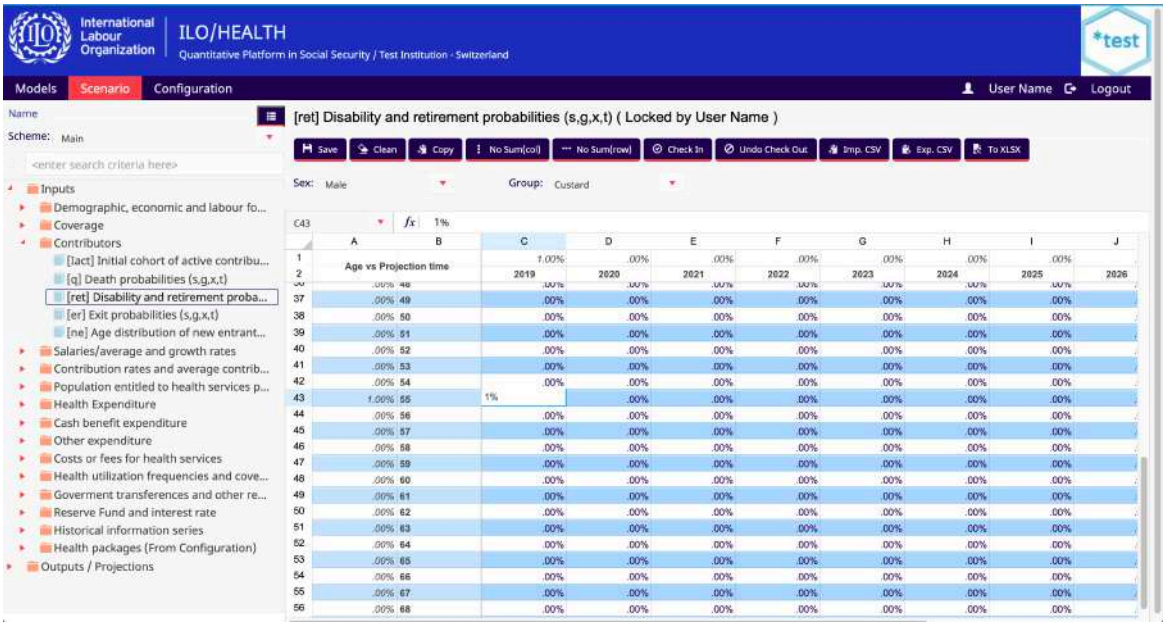


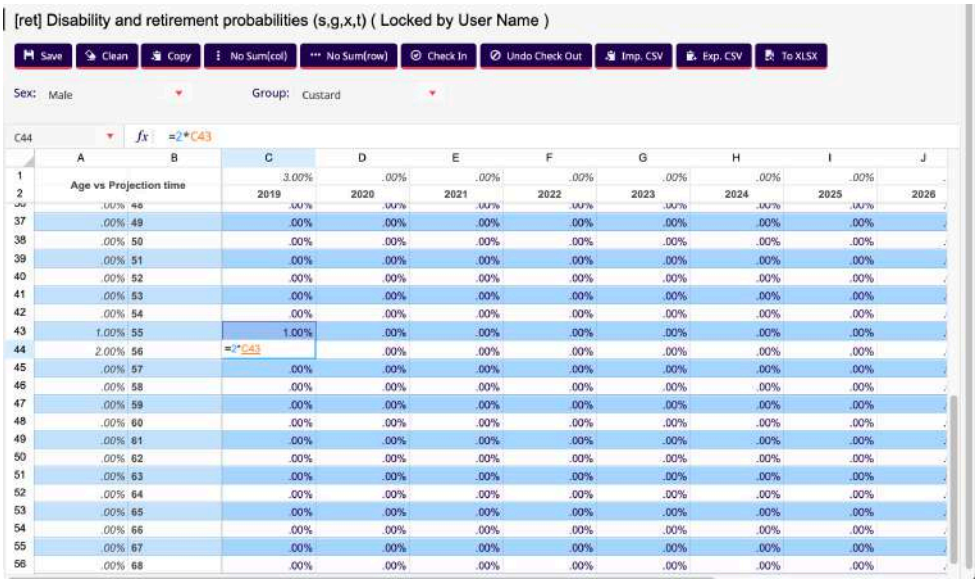


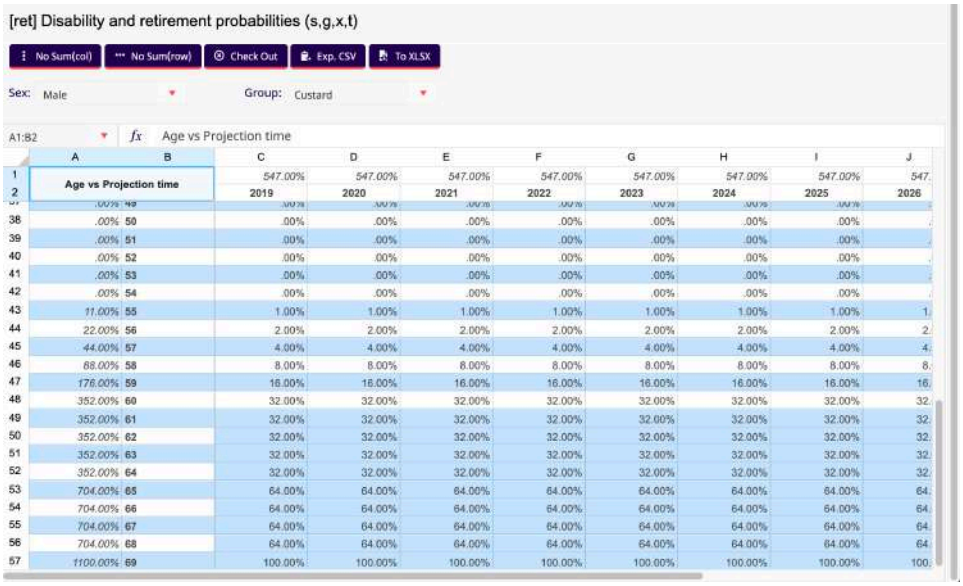
6.2.1.3. *Retirement probabilities*

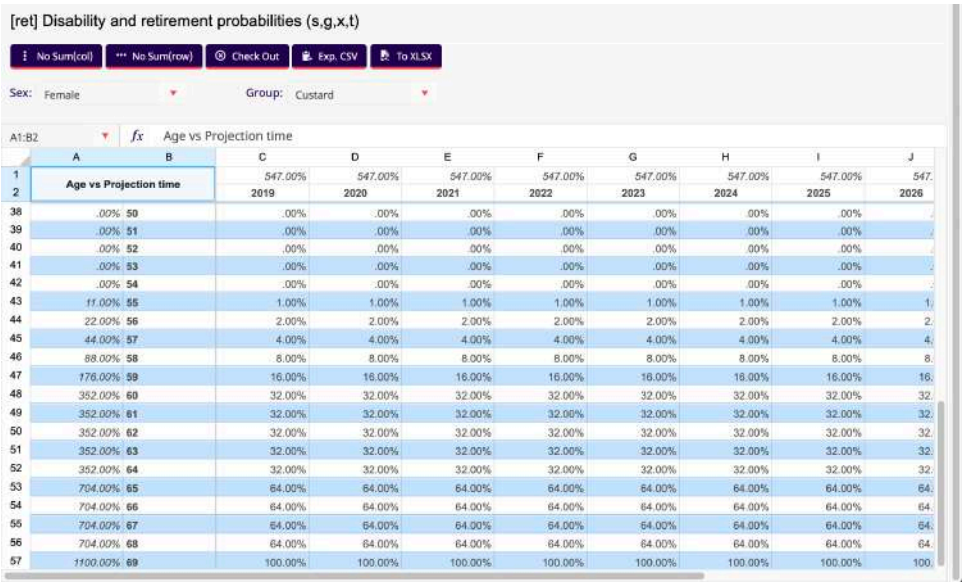
Retirement probabilities are as follows: for age 55, it is 1 per cent. This percentage doubles for every age up to 60. From 61 to 64, it remains constant at the same level as at 60. From 65 to 68, it is again constant at double that of 64. At age 69, it is a 100 per cent.

➔ Fill in the matrices for retirement probabilities [ret] for both sexes in the same way as above.





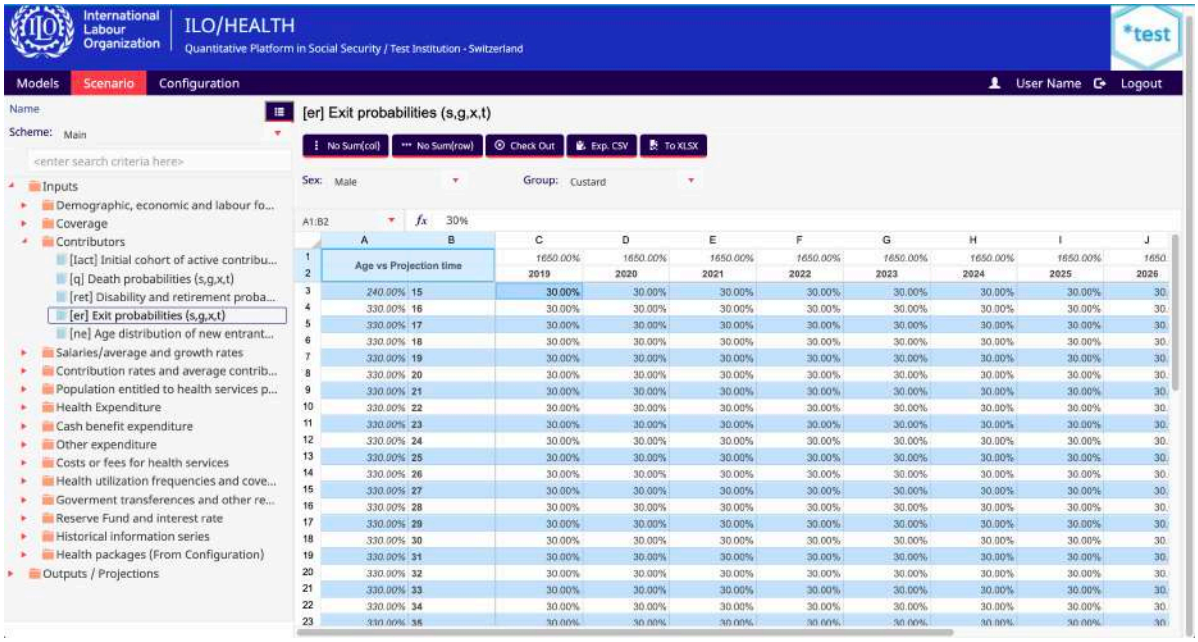


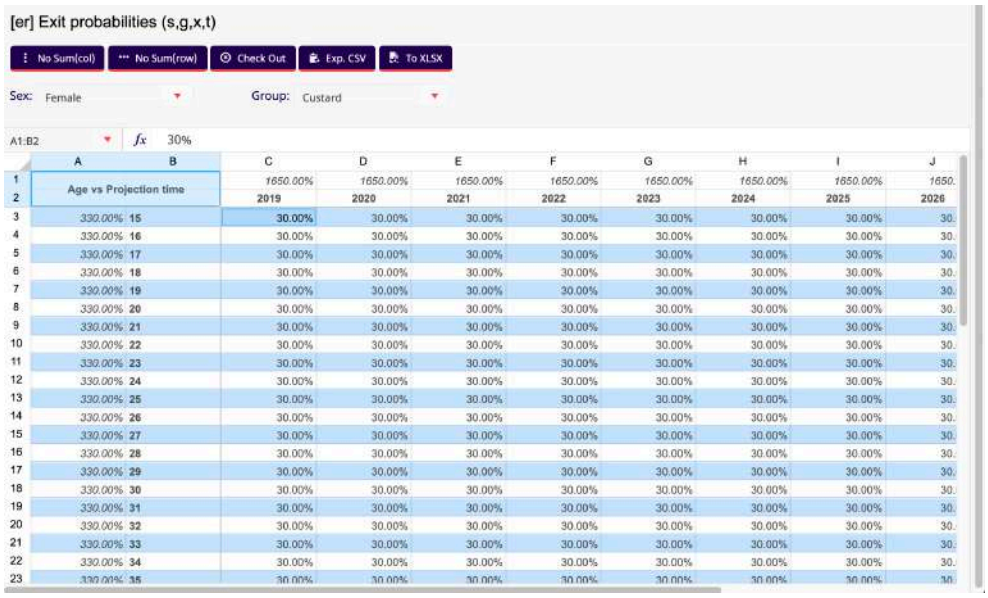


6.2.1.4. *Exit rate*

The exit rate [er] is a constant 30 per cent for all sexes and ages over the entire projection.

➔ Fill in the matrices for an exit rate [er] of 30 per cent for both sexes.





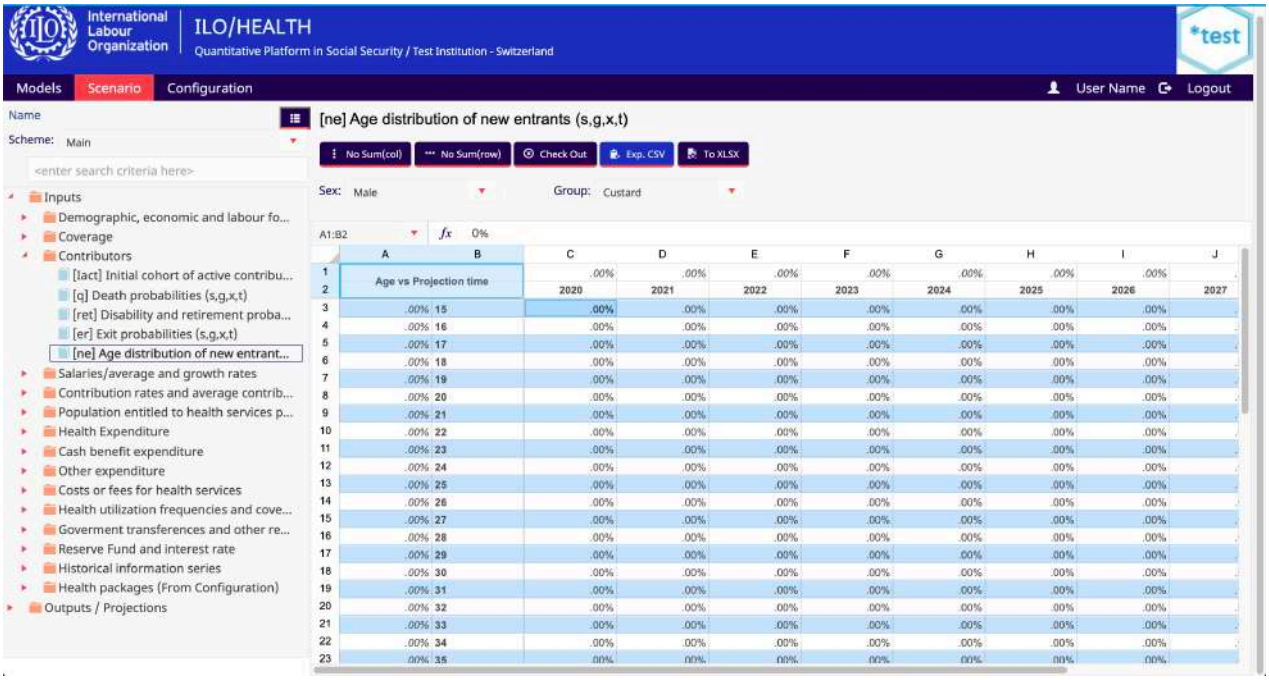
6.2.1.5. *New entrants*

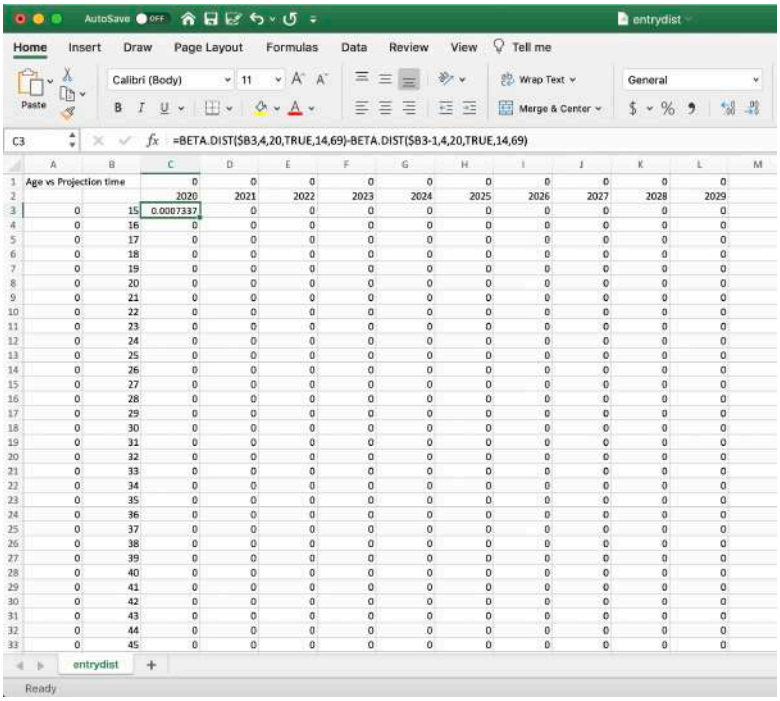
The final matrix to fill in this section is the age distribution of new entrants [ne]. The distribution will be the same for male and female: in the shape of a beta distribution with parameters alpha = 4 and beta = 20.

➔ To do this, export the matrix to a csv file and then save it to a folder with a name such as “entrydist.csv”. Then open the file and paste the formula below in all cells that have 0:

=BETA.DIST($B3,4,20,TRUE,14,69)-BETA.DIST($B3-1,4,20,TRUE,14,69) in the cell C3.

➔ Import the series as a csv file for the matrix [ne] for male and female.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
[lact] Initial cohort of active contribu...
[q] Death probabilities (s,g,x,t)
[ret] Disability and retirement proba...
[er] Exit probabilities (s,g,x,t)
[ne] Age distribution of new entrant...
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[ne] Age distribution of new entrants (s,g,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0%
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027


AutoSave
entrydist
Home
Insert
Draw
Page Layout
Formulas
Data
Review
View
Tell me
Paste
Calibri (Body)
11
Wrap Text
Merge & Center
General
C3
=BETA.DIST(SB3,4,20,TRUE,14,69)-BETA.DIST(SB3-1,4,20,TRUE,14,69)
Age vs Projection time
2020
2021
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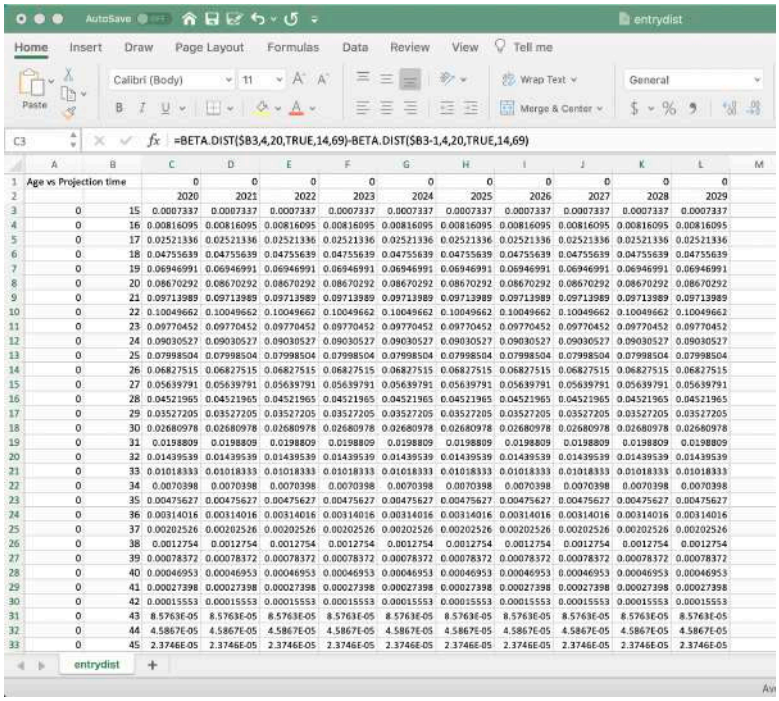
0.0007337
entrydist
Ready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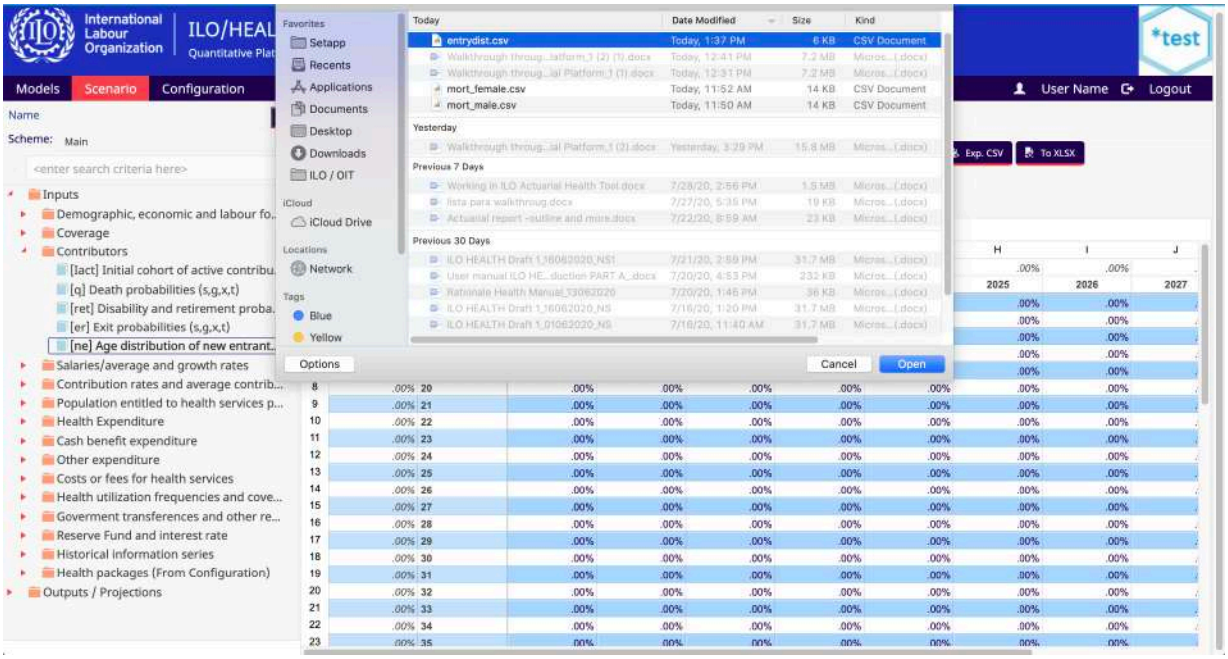
Formulas
Data
Review
View
Tell me
Paste
Calibri (Body)
11
Wrap Text
General
Merge & Center
C3
=BETA.DIST($B3,4,20,TRUE,14,69)-BETA.DIST($B3-1,4,20,TRUE,14,69)
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
entrydist


[ne] Age distribution of new entrants (s,g,x,t) (Locked by User Name)
Save
Clean
Copy
No Sum(col)
No Sum(row)
Check In
Undo Check Out
Imp. CSV
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0%
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027


International Labour Organization
ILO/HEAL
Quantitative Plat
Models
Scenario
Configuration
*test
User Name
Logout
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
[lact] Initial cohort of active contribu...
[q] Death probabilities (s,g,x,t)
[ret] Disability and retirement proba...
[er] Exit probabilities (s,g,x,t)
[ne] Age distribution of new entrant...
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
Favorites
Setapp
Recents
Applications
Documents
Desktop
Downloads
ILO / OIT
iCloud
iCloud Drive
Locations
Network
Tags
Blue
Yellow
Today
Date Modified
Size
Kind
entrydist.csv
Today, 1:37 PM
6 KB
CSV Document
mort_female.csv
Today, 11:52 AM
14 KB
CSV Document
mort_male.csv
Today, 11:50 AM
14 KB
CSV Document
Yesterday
Previous 7 Days
Previous 30 Days
Options
Cancel
Open
Exp. CSV
To XLSX
2025
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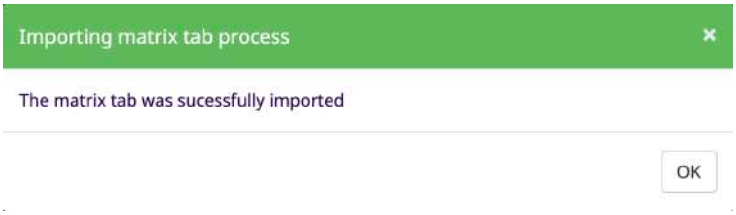
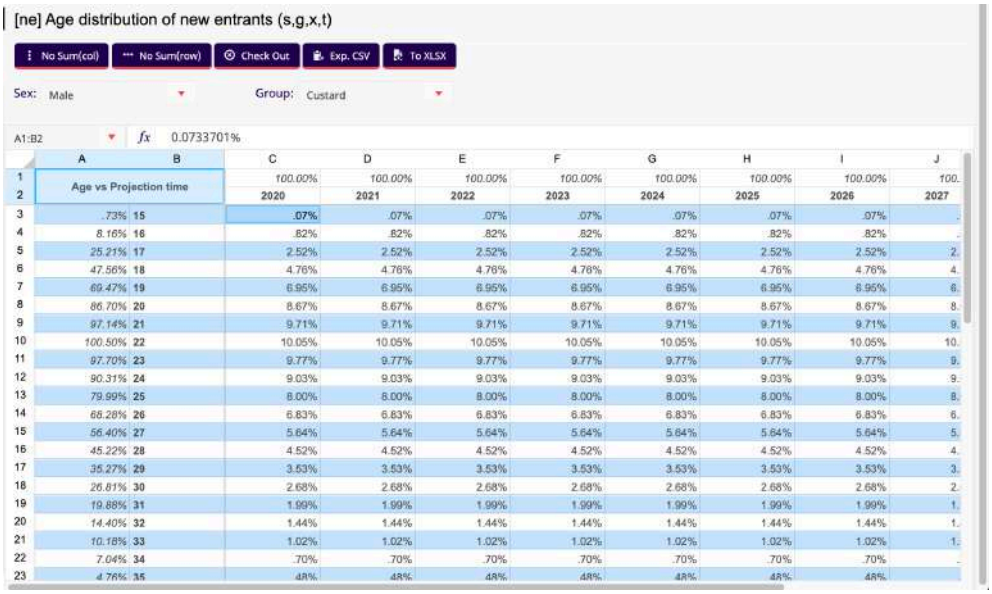

Importing matrix tab process
The matrix tab was sucessfully imported
OK


[ne] Age distribution of new entrants (s,g,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0.0733701%
Age vs Projection time
2020
2021
2022
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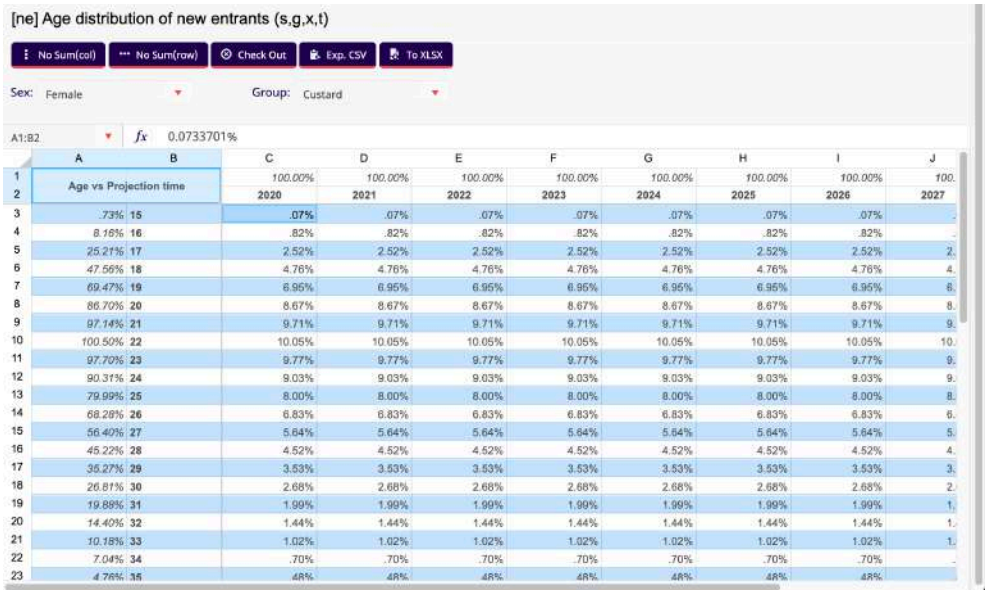


6.2.2. Filling in the total covered population projection

All the matrices in this section can be found in the navigation tree: Inputs > Demographic, Economic and Labour force. These matrices form the key inputs (stocks) for the demographic transitions of the model (flows). [30]

The tootal covered population is calculated as follows:

- **Inputting a projection per year of the total national population by sex** for the whole projection period
- **Extracting the projected labour force from the total national population projection** by multiplying it by the participation rate for each sex and year.

> **TIP:** Users should remember to use the participation rate calculated over the total population, which differs from the one calculated over the working age population. Users should identify which one is reported in the national statistics, calculate the one needed and review consistency.

[30] The link between macro projection of coverage and the single age projection of demographic groups.

- **Extracting the total covered active population**[31] of a group from the labour force by multiplying it by the coverage rate by group, sex and year and discounting the unemployed portion of the labour force.[32]

> **TIP:** Coverage as active covered is calculated by group, so users should ensure that in a situation where there are multiple groups, the sum of the coverage of all groups is consistent with total coverage. Additionally, each scheme has its coverage assumptions, so users should take extra care when working in multi-scheme models.

For this exercise, the idea is to create a scenario with increasing covered population as follows:

- A population that grows 2 per cent per year over the projection period and for the first projection year is a million people in total, equally composed of male and female.
- A participation rate that is constant at 70 per cent for males but increases 5 percentage points each year for females, beginning at 40 per cent to a maximum of 70 per cent.
- The unemployment rate is 5 per cent for males and 3 per cent for females.
- The coverage rate is a little more complicated: it is the same for male and female, but is equal to 1/6th the natural logarithm of the number of projection years plus one.

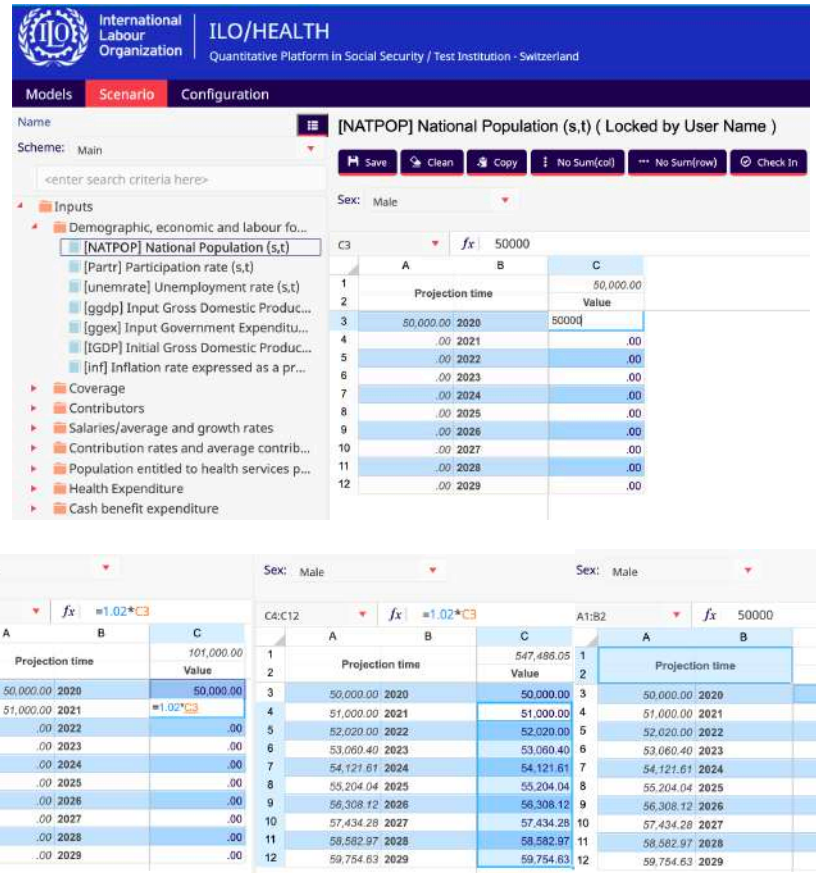
➔ Users should first attempt to fill in the corresponding matrices using the above information and then compare them to results from the method for filling them in described below.

➔ To add a population growth rate of 2 per cent per year: Check out the matrix named National Population [NATPOP] by navigating to Input->Context: Demographic, Economic and Labour Market->Demographic->NATPOP. Users will see a box at the top indicating that this is for males in the national population. In the top cell of the matrix [C3], write in 50000. This is the starting population. In the next cell, write in the formula =1.02*[C3]. (i.e., write "=1.02*" and then select cell C3). Select the plus sign at the bottom corner of the cell and drag it to the end of the column. This enables users to input that the population grows at a rate of 2 per cent annually.

➔ Check out of this matrix and repeat for the female matrix.

[31] A positive change in the Total Covered Active Population over time means that the number of entries will equal the change and the exits from covered population in the previous period. If the change is zero, the number of entries will be reposition the exits greater or equal to zero. If the change is negative, there is a theoretical risk of negative entries. ILO/HEALTH will keep entries at zero and artificially increase the number of covered populations. If users need to adjust the total covered population to the macro projection, some changes in exit probabilities are required.

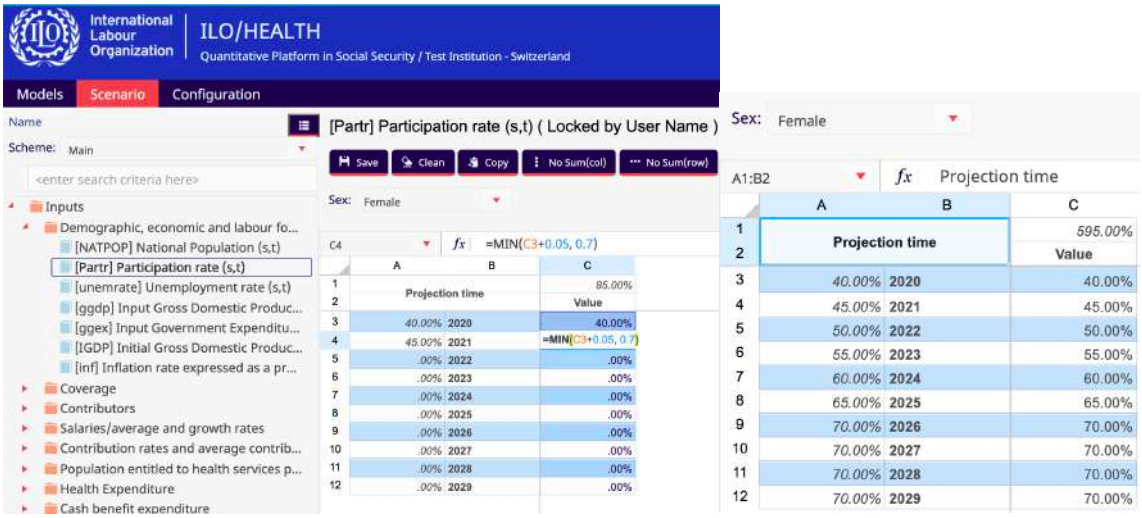
[32] Unemployment rates are usually expressed as a percentage of unemployed people in the labour force, thus coinciding with the definition used in this model.



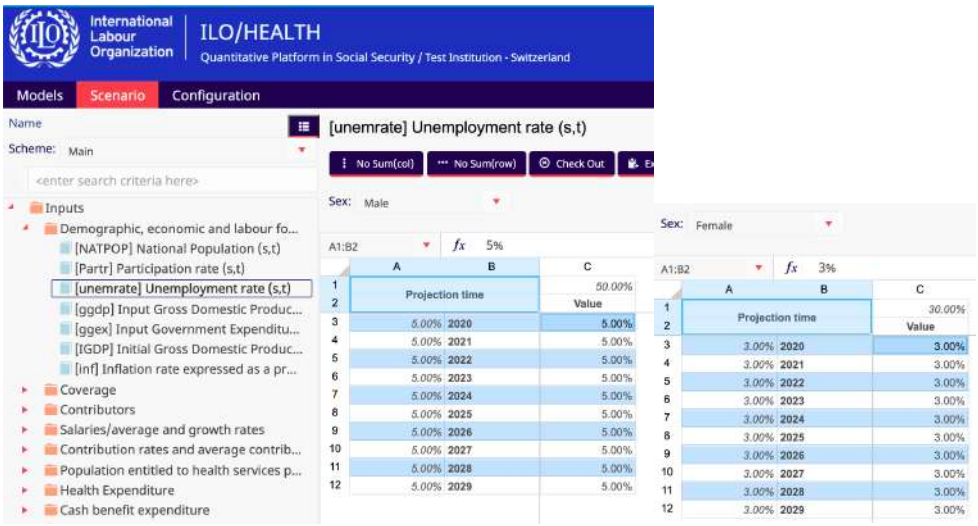
To add the respective labour force participation rates for males (70 per cent) and females (40 per cent + 5 percentage points annually):

➔ Go to the matrix for participation rate [Partr]. In Partr, make sure that the option "male" is selected in the dropdown menu. Check out the matrix and fill in all cells with the value 70 per cent. Check in. Now, in the matrix for female: Enter 40 per cent in the first cell; in the second write the formula: =MIN(C3+.05,.7) and copy it over the rest of the matrix before checking it in.[33]

[33] This function can be explained in two parts. First, consider "C3 + 0.05". This simply means "add 5 percentage points to the selected cell", in this case, to the previous year. If the female labour force participation rate starts at 40 per cent and increases by 5 percentage points a year, the first row, C3, would be 40 per cent and the next row would be (40 + 5) per cent or 0.4+0.05.
Next, consider MIN, a function used to select the lowest value in a range of values. Use it to set 70 as the maximum. In this case, the two numbers are 70 (the maximum) and the value that reflects the increase in the female labour force participation rate. i.e., C4, C5, and so on. Any number in this range is fine as long as it is below 70, because the MIN function will select this number. However, as soon as female labour force participation starts to exceed 70, the function starts to select 70 as the minimum number, effectively setting it as the maximum.

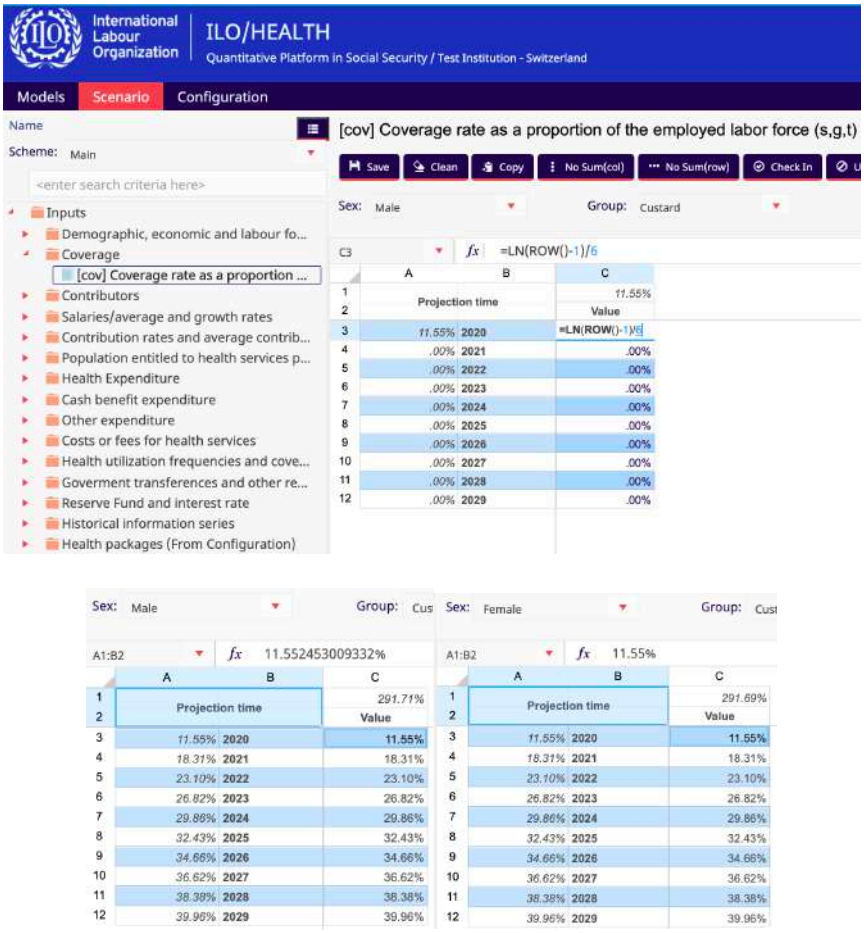


➔ The matrix for unemployment rate is [unemrate]. Enter 5 per cent for males and 3 per cent for females.



➔ Finally, the coverage rate is the matrix [cov]. This is found in: Inputs > Coverage. Users will normally enter their own formula for coverage, but for this exercise, they should fill in the cells with the formula =LN(ROW()-1)/6 for both male and female.[34]

[34] ROW() returns the value of the current row, so in row 2 it will return a 2. Subtracting 1 reduces the value of every row by one in the formula. Finally, users should apply the Napierian logarithm and divide by 6



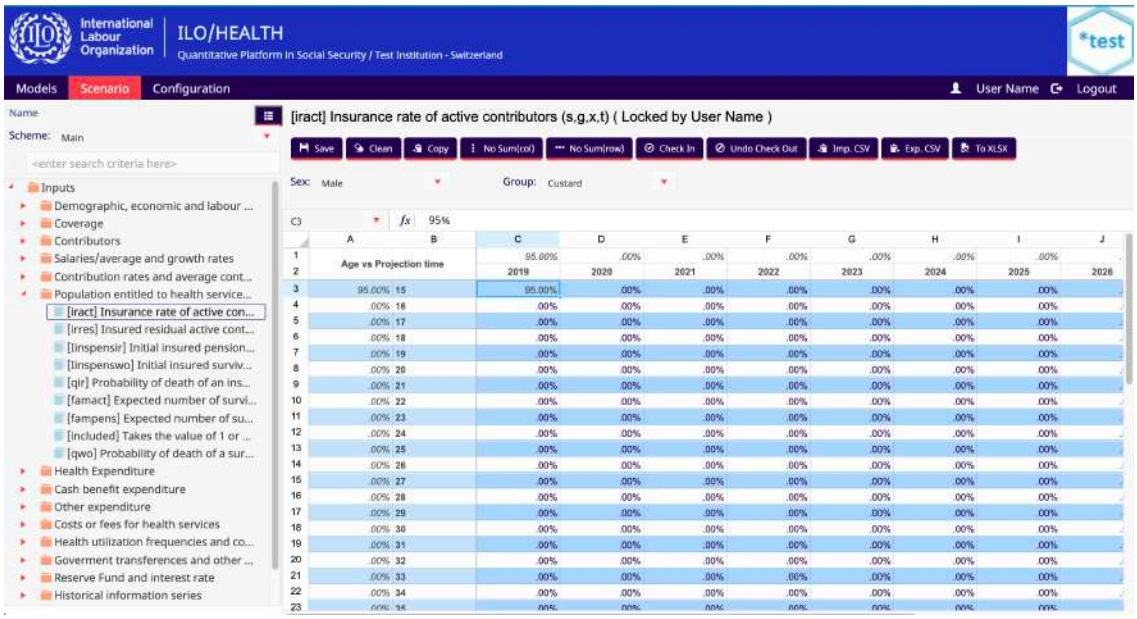
TIP: Users may choose to calculate the values in a different program (MS Excel, for instance) and paste them in the matrices if they prefer. To do this, in the Scenario menu, use the "Export all scenario" tab to export all the files as Excel files, and then modify and import each relevant file individually within an open scenario.

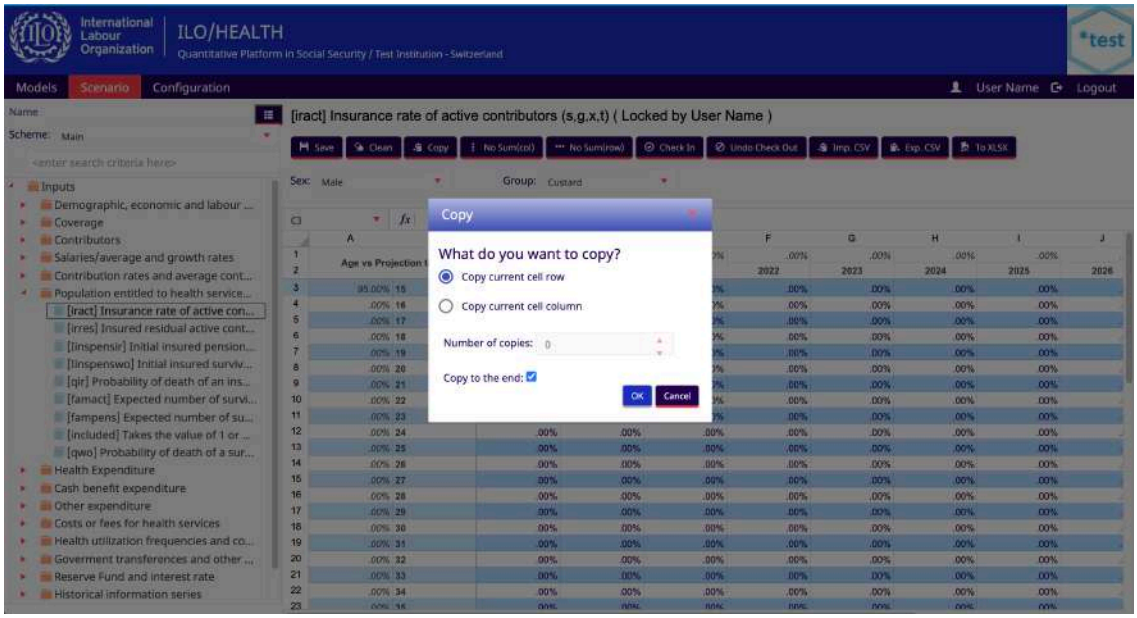
6.2.3. Filling in the projection matrices for the population entitled to healthcare services

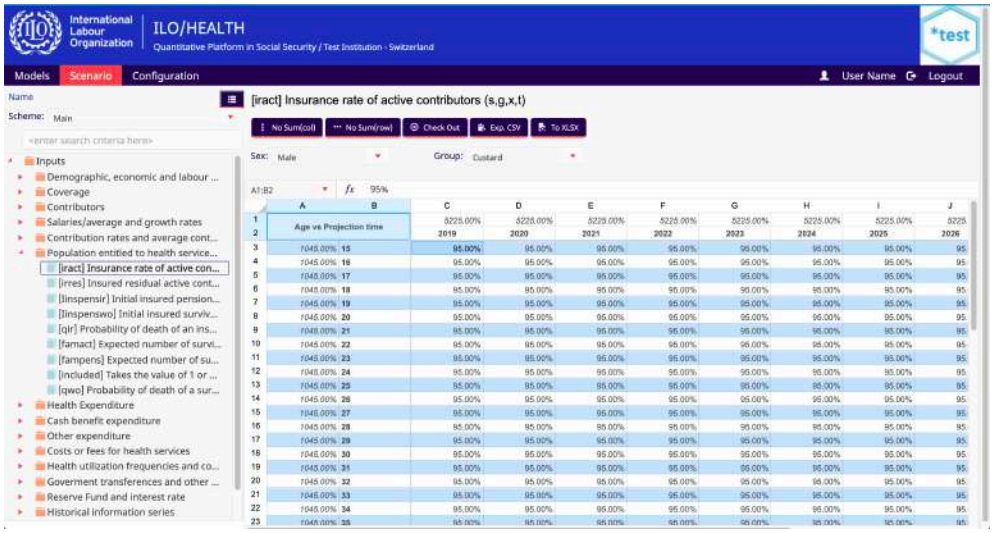
All the matrices in this section matrices can be found in the navigation tree: Inputs > Population entitled to health services projection. These matrices comprise: Insurance rate of active contributors [iract], insured residual active contributors as a percentage of insured active contributors [irres], initial insured pensioners [Iinspensir] and survivor pensioners [Iinspenwo]. They also include probabilities of death of insured pensioners [qir] and survivor pensioners [qwo], expected number of survivors from death of pensioner [famact] or survivor pensioners [fampens], and whether the population is included in the scheme.

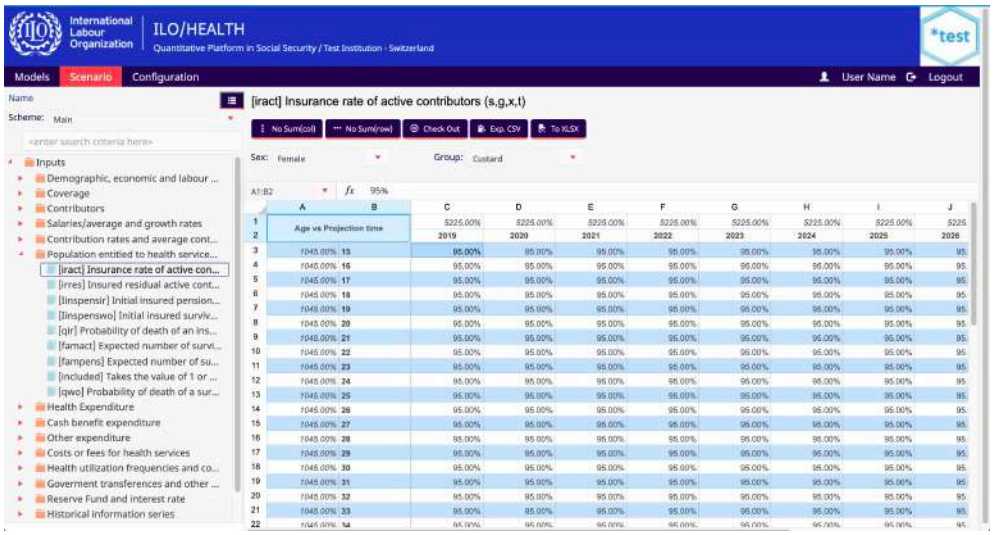
These matrices are filled in as follows:

➔ Insurance rate of active contributors [iract] is a constant 95 per cent for all ages and sexes. An easy way to do this in is to write 95 per cent in the first cell, C3, of one matrix and then use the Copy command to copy it in all rows and columns. Next, users should highlight all the active cells – those containing 95 per cent– and press Ctrl + C. Check in this matrix, check out the matrix for the other sex, paste in the values, and check it in.

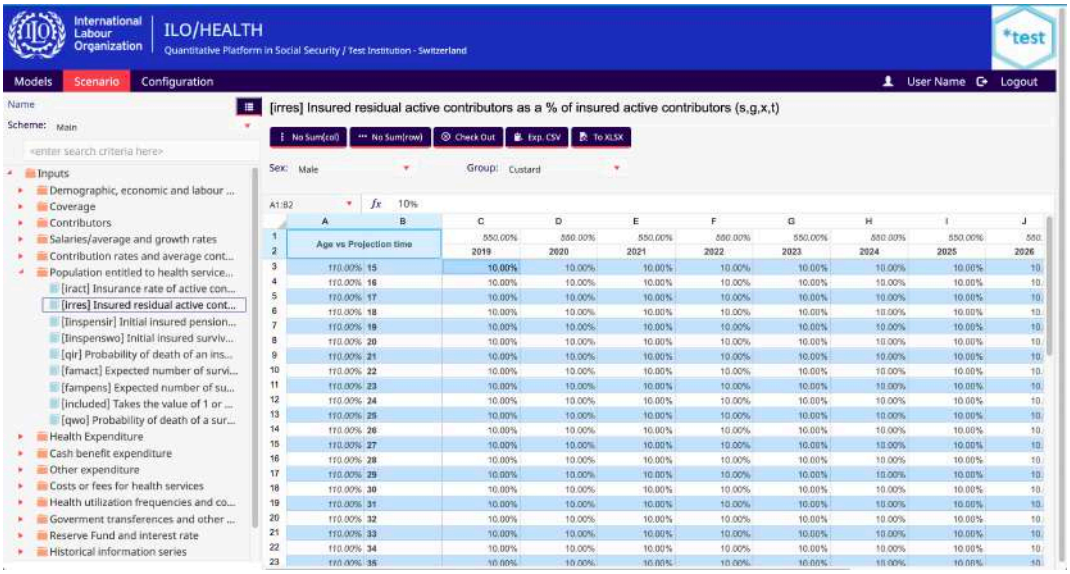


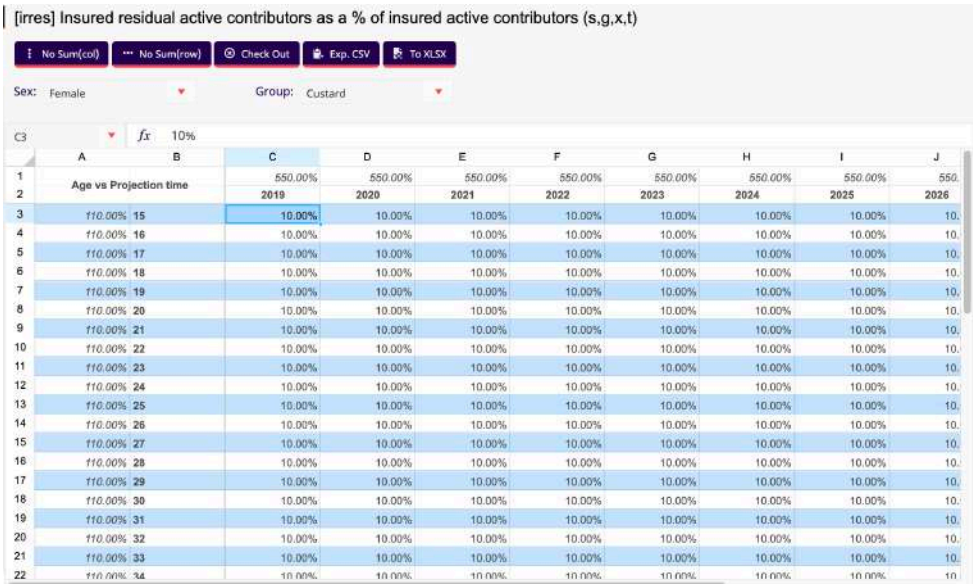




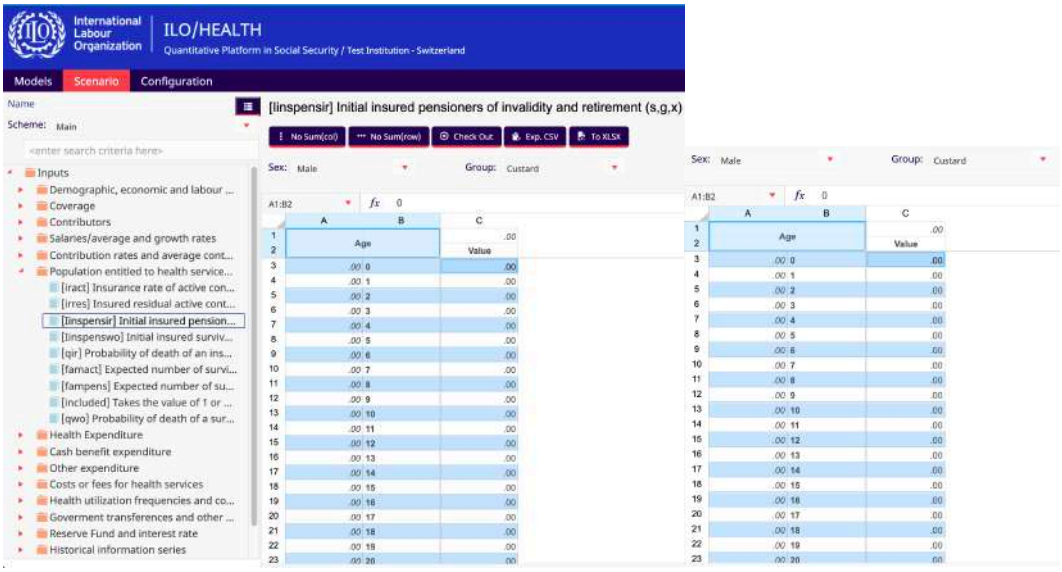


➔ Insured residual active contributors as a percentage of insured active contributors [irres] is a constant 10 per cent for all ages and sexes. Users should enter this percentage using the shortcut described above.

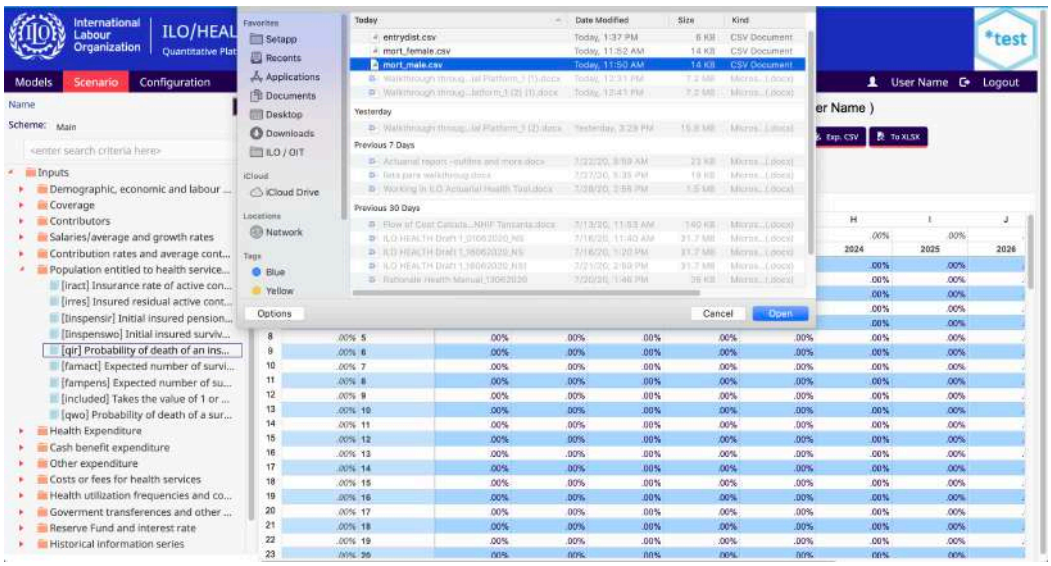


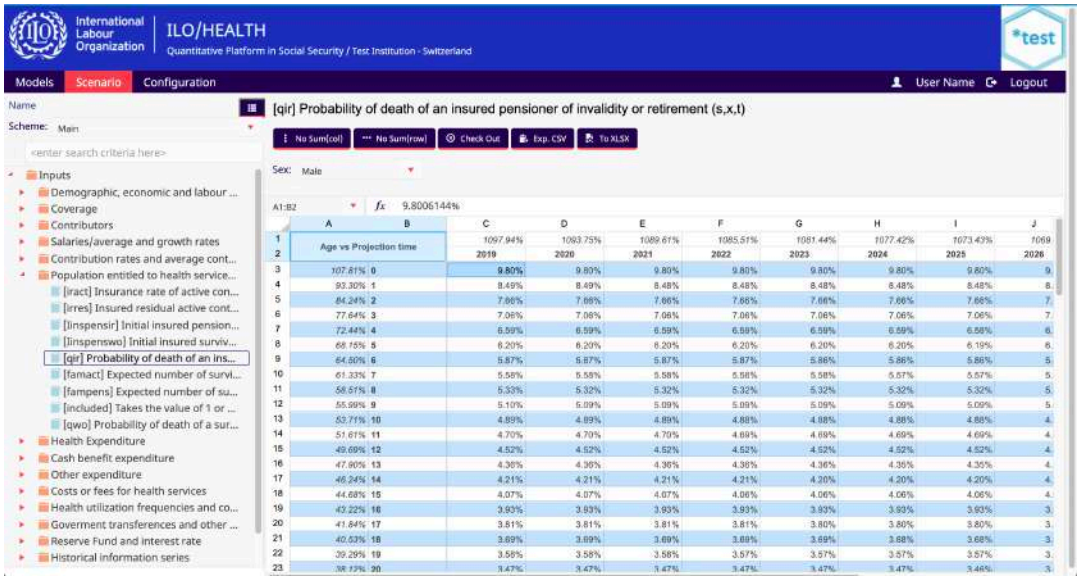


➔ Initial insured pensioners [Iinspensir] and survivor pensioners [Iinspenwo] are both 0 for the purpose of this exercise. Users should check these out and in for both sexes to increase the completion rate.



➔ Probabilities of death of insured pensioners [qir] are filled out in the same way as [q] above (section 6.2.1.2).




International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
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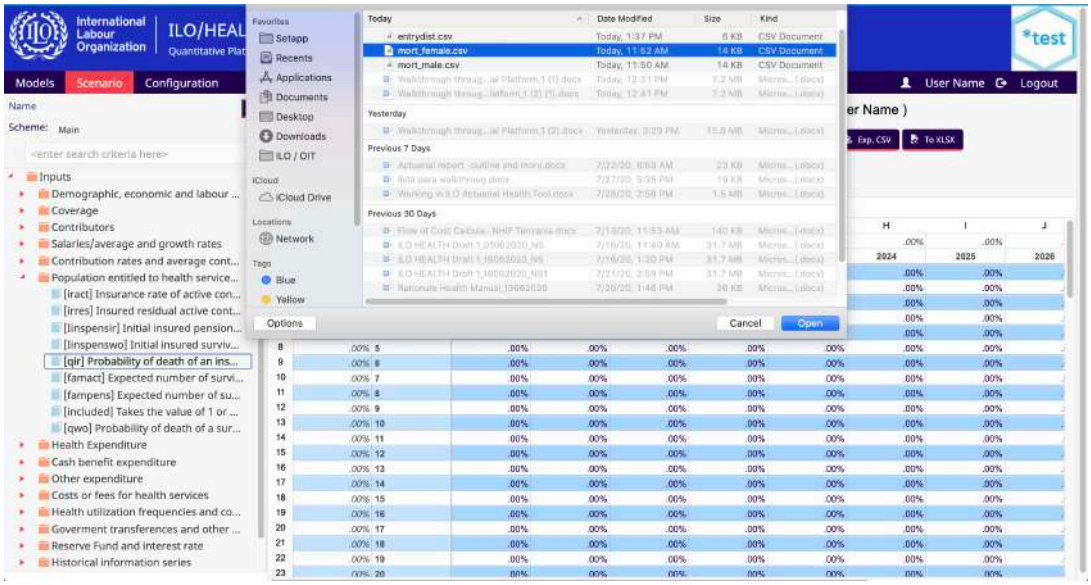
Inputs
Demographic, economic and labour ...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average cont...
Population entitled to health service...
[iract] Insurance rate of active con...
[irres] Insured residual active cont...
[linspensir] Initial insured pension...
[linspenswo] Initial insured surviv...
[qir] Probability of death of an ins...
[famact] Expected number of survi...
[fampens] Expected number of su...
[included] Takes the value of 1 or ...
[qwo] Probability of death of a sur...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
[qir] Probability of death of an insured pensioner of invalidity or retirement (s,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
A1:B2
9.8006144%
Age vs Projection time
2019
2020
2021
2022
2023
2024
2025
2026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Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average cont...
Population entitled to health service...
[iract] Insurance rate of active con...
[irres] Insured residual active cont...
[linspensir] Initial insured pension...
[linspenswo] Initial insured surviv...
[qir] Probability of death of an ins...
[famact] Expected number of survi...
[fampens] Expected number of su...
[included] Takes the value of 1 or ...
[qwo] Probability of death of a sur...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
Favorites
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Recents
Applications
Documents
Desktop
Downloads
ILO / OIT
iCloud
iCloud Drive
Locations
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Yellow
Today
Date Modified
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entrydist.csv
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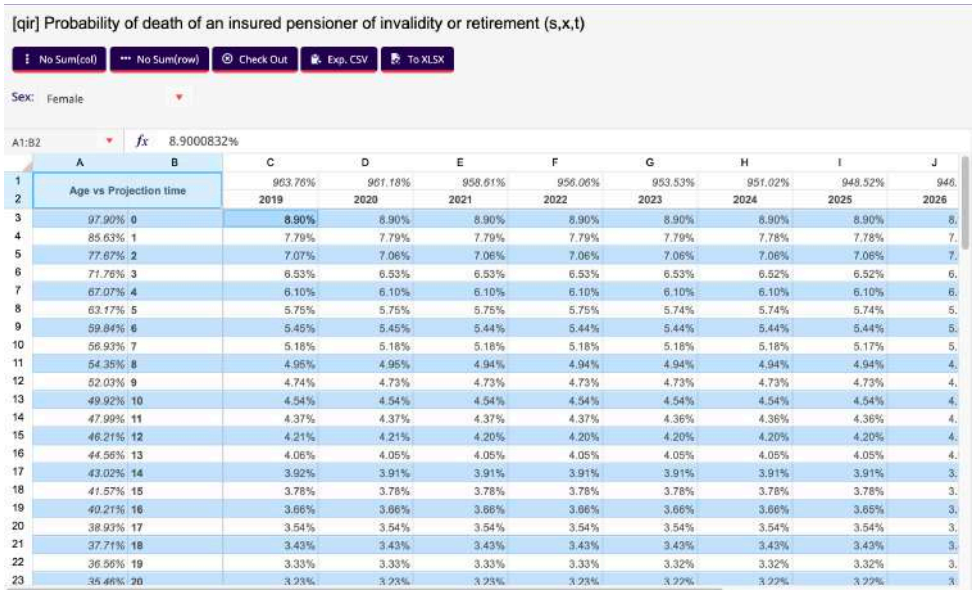
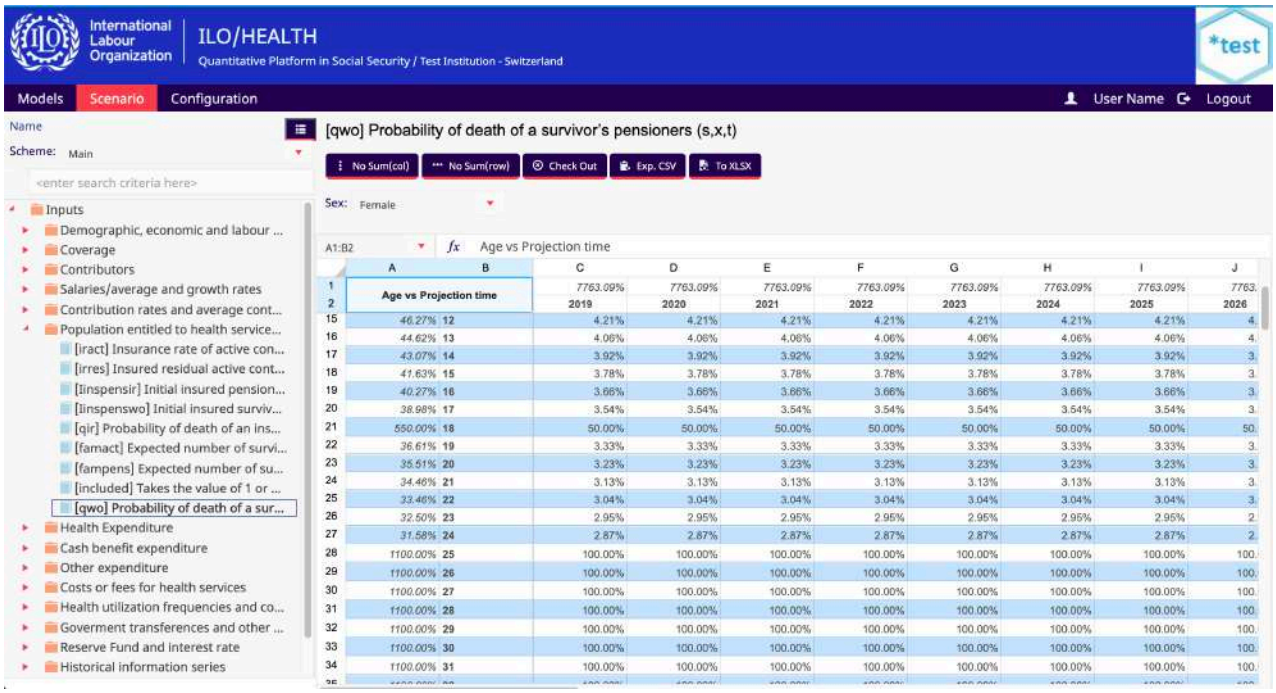
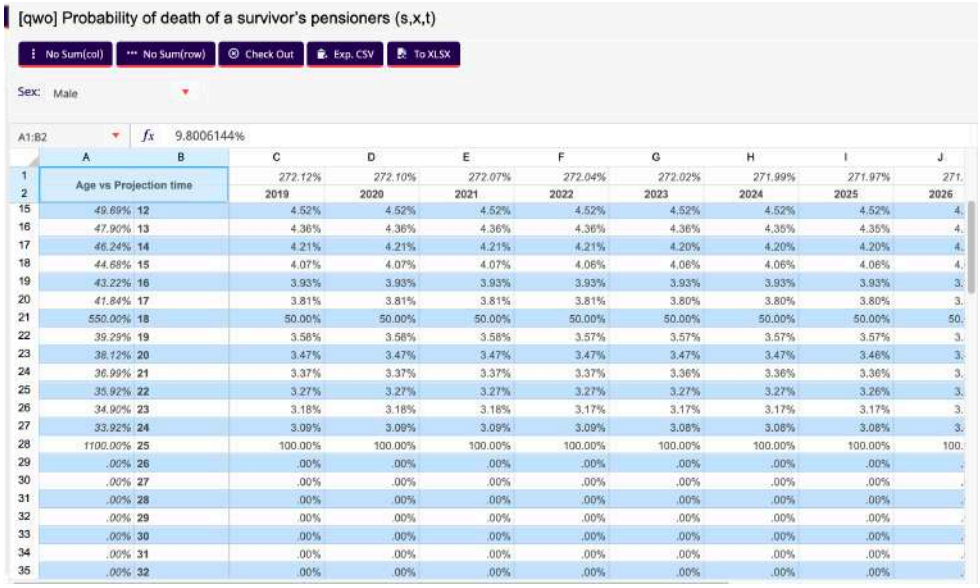


The survivor pensioners matrix [qwo] is filled in the same as [qir]. However, ages 18 and 25 have a mortality [qwo] rate of 50 per cent at age 18 and 100 per cent at age 25 for both sexes.

➔ Repeat the steps for [qir] for survivors [qwo]. However, for age 18, write 0.5 in the first column and copy it across to the last year of the projection. Similarly, for age 25, write 1 in the first year and copy it across to the last year of the projection. In the cells that follow (ages up to 100), users may input 1 or 0 as there is no real difference in terms of calculations.





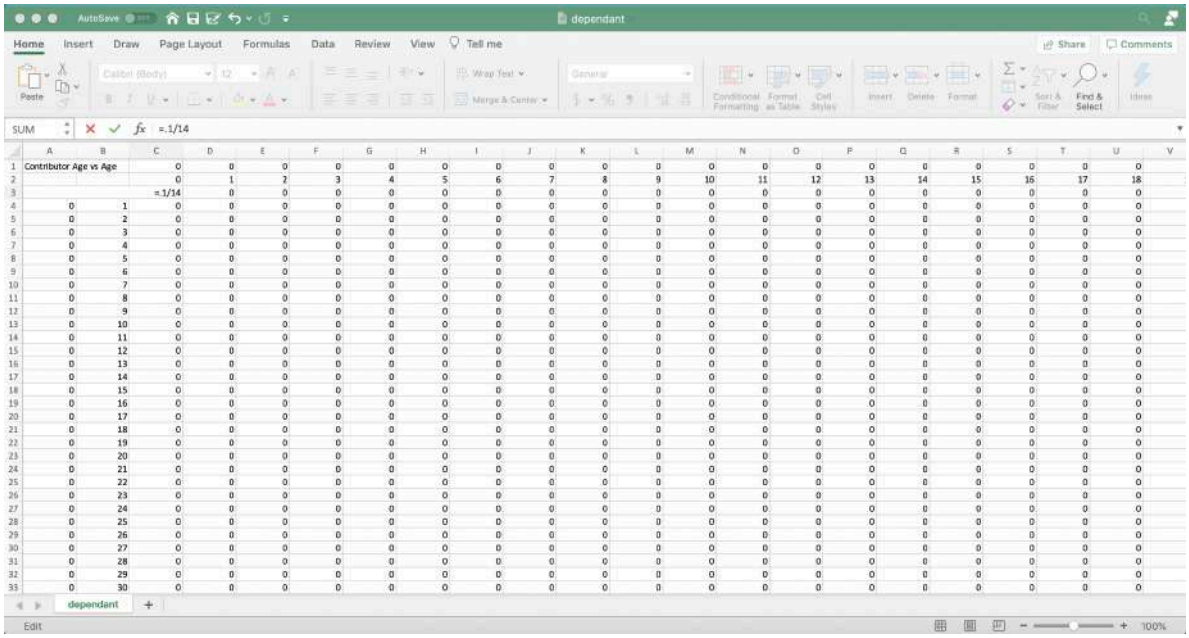
The expected number of dependants from an active contributor or a pensioner is input in the matrices [famact] and [fampens], respectively. Each matrix has a set of four options: male dependants from male contributors, female dependants from male contributors, and vice versa for female contributors.

For a given number in a matrix, the intersection of a row and column shows the expected number of people of the value of a column who are eligible for healthcare insurance (and thus can demand healthcare services) thanks to the contributions of someone whose age is the value in the rows.

Dependants are usually children of the contributors and pensioners, and in some cases, spouses.

This exercise will use a simple dependant family structure. Each contributor (including pensioners) has a 20 per cent probability of having a dependent child. The age of the dependent children is evenly distributed from ages 0 to 14, 50 per cent male, and 50 per cent female. For simplicity's sake, spouses are not covered in this example.

➔ To input this information into the model, check out each of the eight matrices (four famact, four fampens) and write the value =0.1/14 in the cell of the first matrix. Copy the column across the following 14 columns. In the final column, copy the row downwards until the end. Finally, they should check in, select the whole matrix, press Ctrl+C and Check Out to copy this matrix and then Check In and Ctrl+V to paste this information into all the other matrices (alternatively, users may export csv files and import them into the remaining matrices.)


dependant
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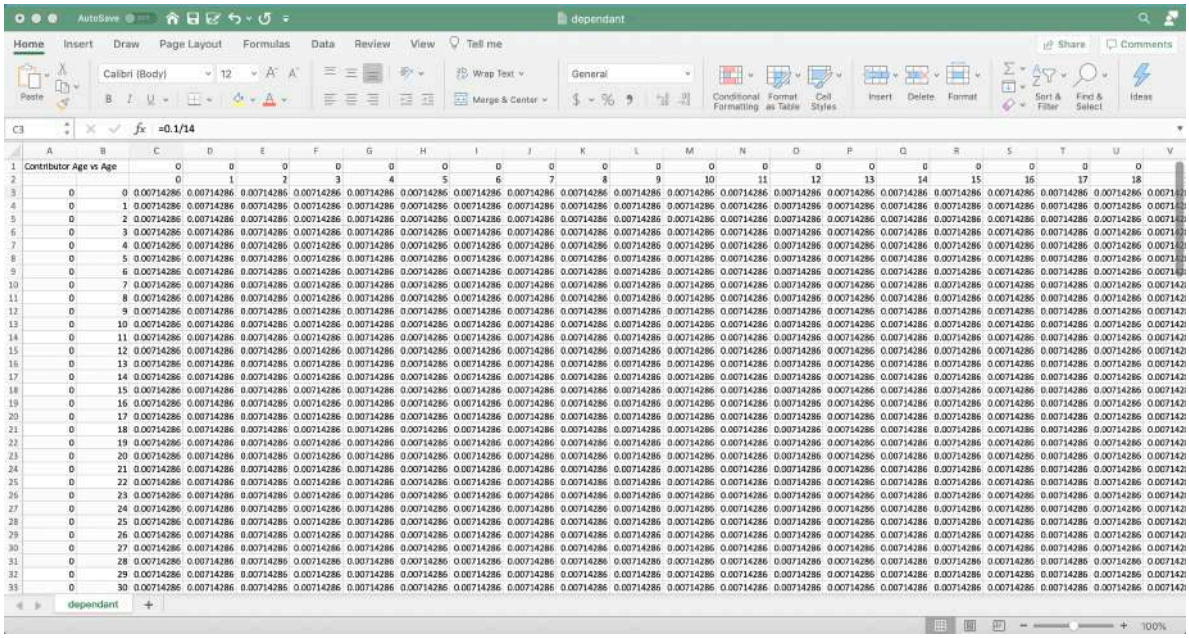
=.1/14
Contributor Age vs Age
dependant
Edit
100%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dependant
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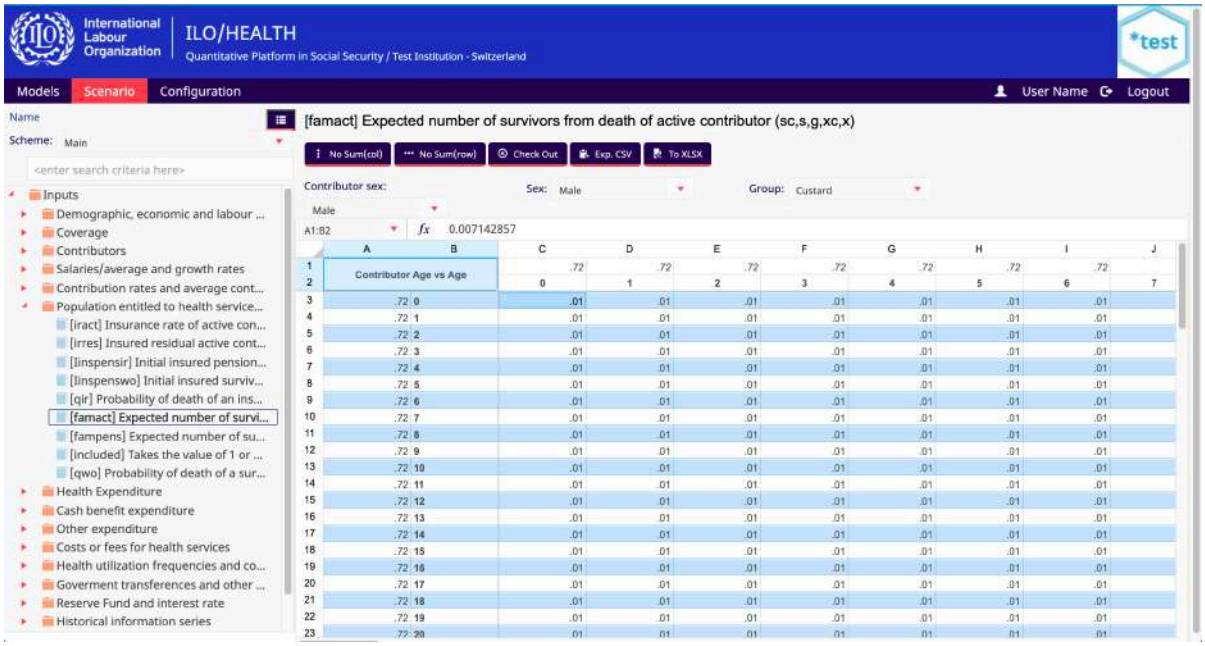
International Labour Organization
ILO/HEALTH
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Models
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Scheme: Main
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Inputs
Demographic, economic and labour ...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average cont...
Population entitled to health service...
[iract] Insurance rate of active con...
[irres] Insured residual active cont...
[iinspensir] Initial insured pension...
[iinspenswo] Initial insured surviv...
[qir] Probability of death of an ins...
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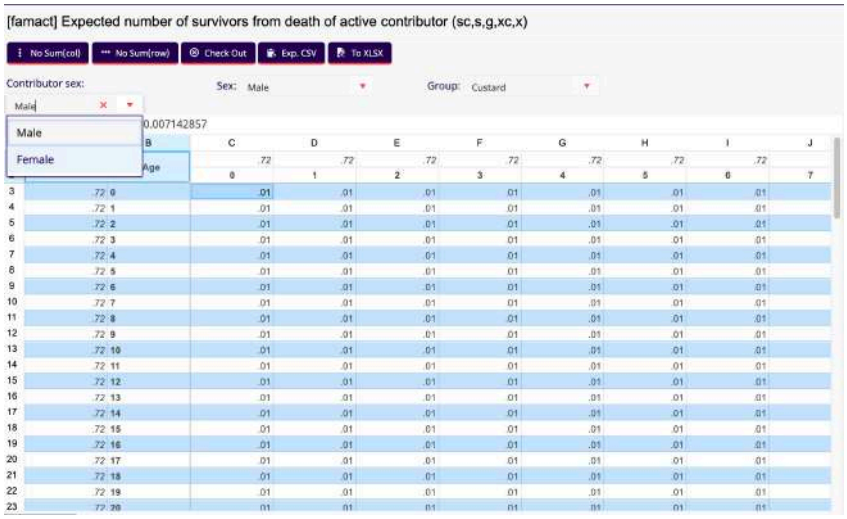
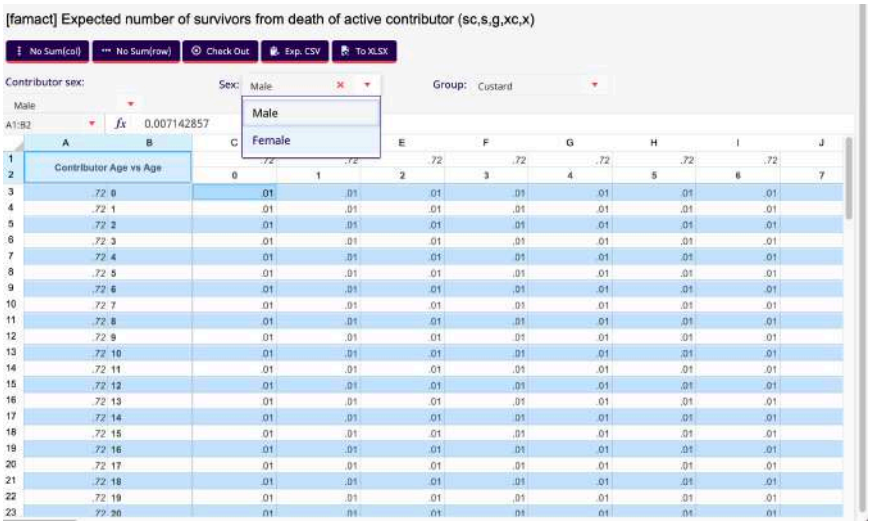
[fampens] Expected number of su...
[included] Takes the value of 1 or ...
[qwo] Probability of death of a sur...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Contributor sex:
Male
Sex: Male
Group: Custard
A1:B2
0.007142857
Contributor Age vs Age


[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Contributor sex:
Male
Sex: Male
Group: Custard
Male
Female
0.007142857


[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
No Sum(row)
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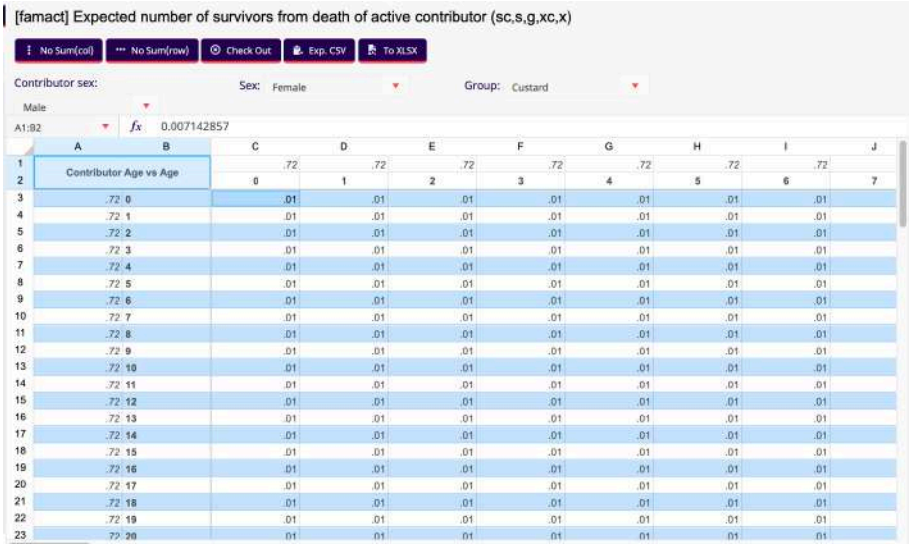
Exp. CSV
To XLSX
Contributor sex:
Male
Sex: Male
Female
Group: Custard
A1:B2
0.007142857
Contributor Age vs Age


[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
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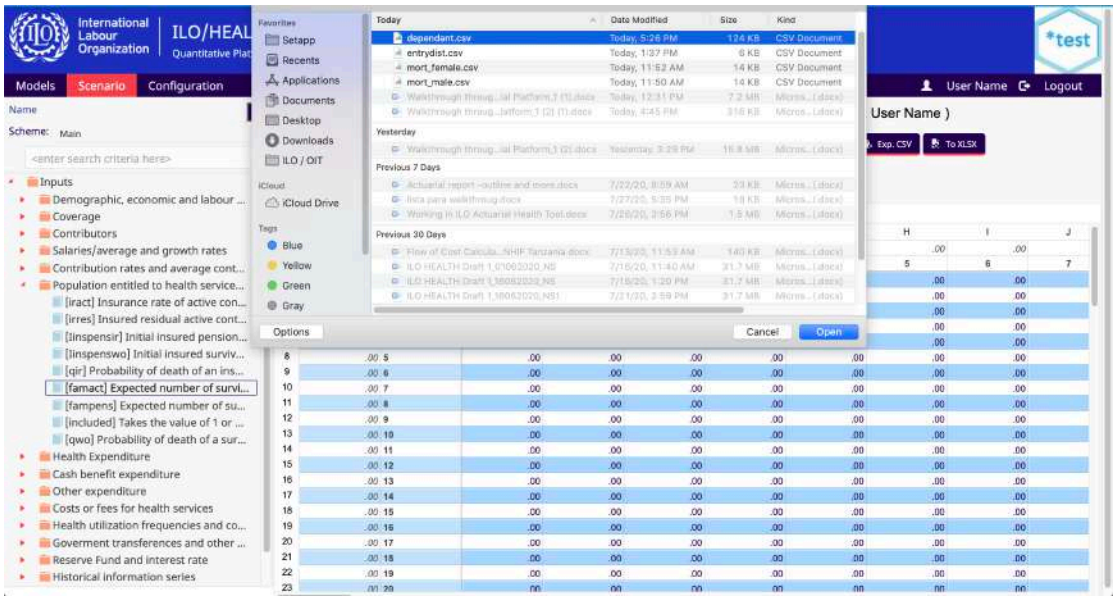
To XLSX
Contributor sex:
Male
Sex: Female
Group: Custard
A1:B2
0.007142857
Contributor Age vs Age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Contribution rates and average cont...
Population entitled to health service...
[iract] Insurance rate of active con...
[irres] Insured residual active cont...
[linspensir] Initial insured pension...
[linspenswo] Initial insured surviv...
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[famact] Expected number of survi...
[fampens] Expected number of su...
[included] Takes the value of 1 or ...
[qwo] Probability of death of a sur...
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Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
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Documents
Desktop
Downloads
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Tags
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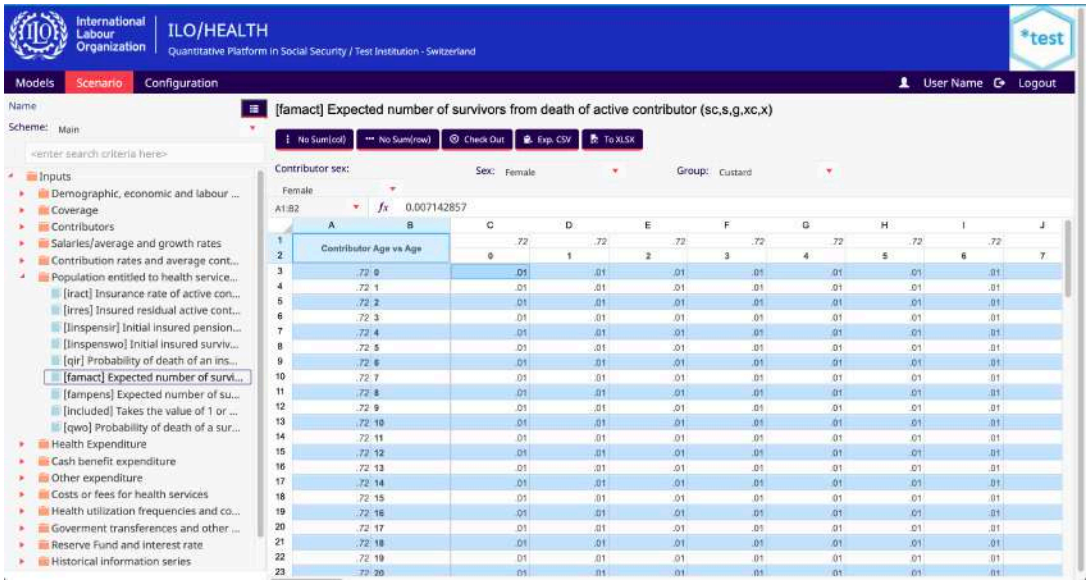
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Population entitled to health service...
[iract] Insurance rate of active con...
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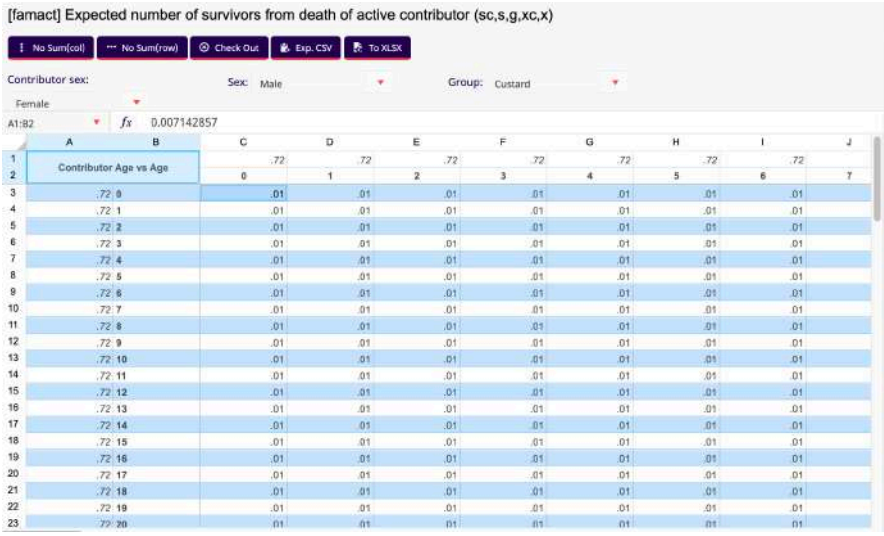
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Contributor sex:
Female
Sex: Female
Group: Custard
A1:B2
0.007142857
Contributor Age vs Age


[famact] Expected number of survivors from death of active contributor (sc,s,g,xc,x)
No Sum(col)
No Sum(row)
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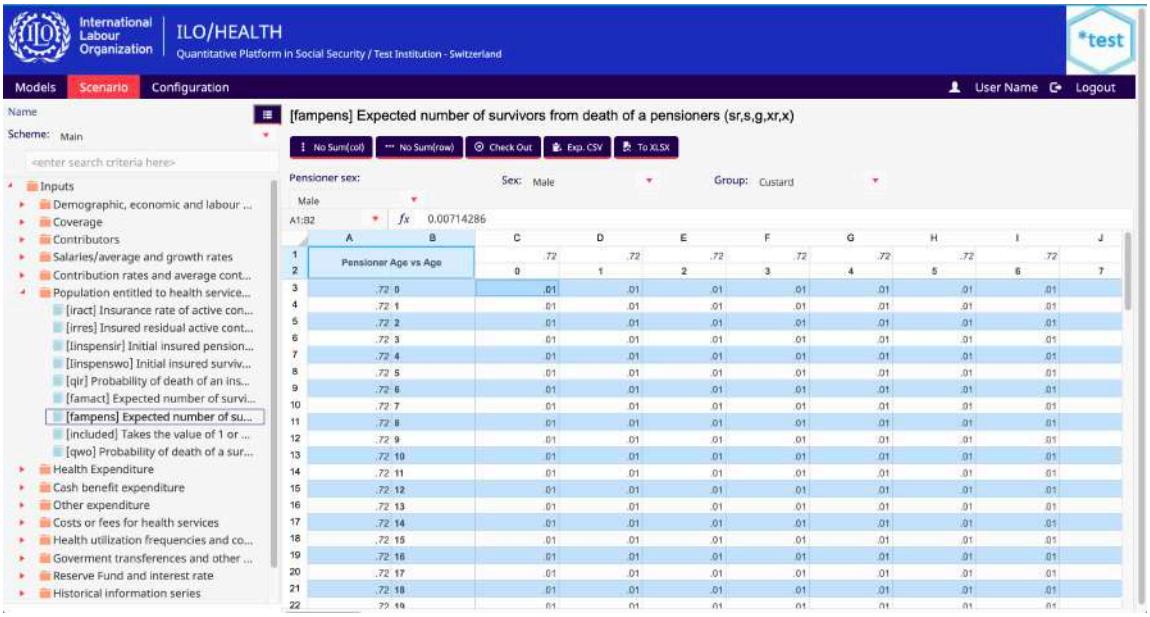
To XLSX
Contributor sex:
Female
Sex: Male
Group: Custard
A1:B2
0.007142857
Contributor Age vs Age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[qir] Probability of death of an ins...
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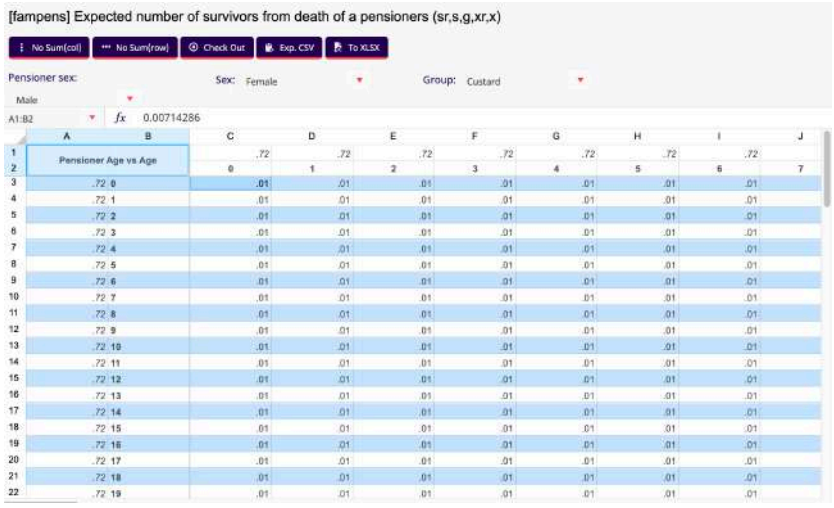
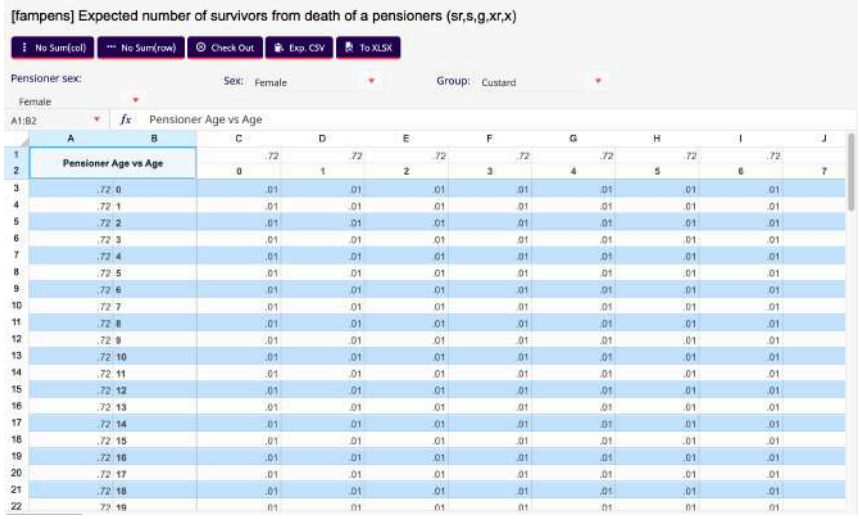
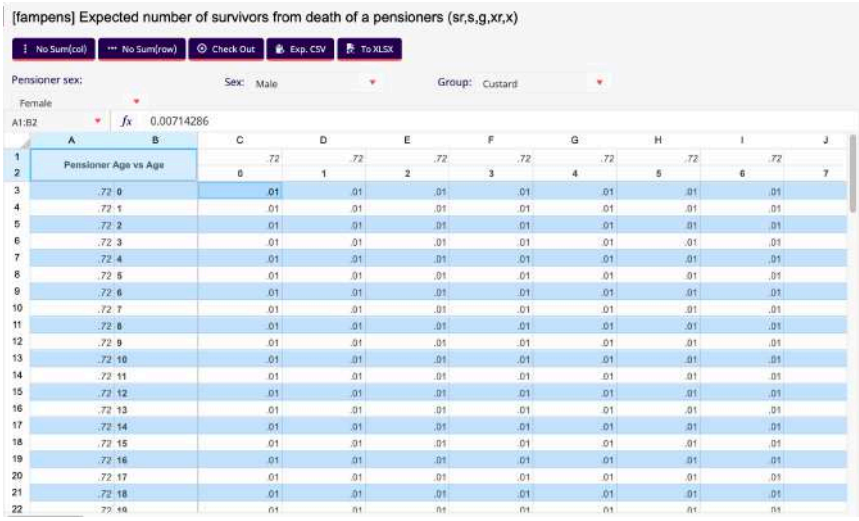
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series
[fampens] Expected number of survivors from death of a pensioners (sr,s,g,xr,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Pensioner sex:
Male
Sex: Male
Group: Custard
A1:B2
0.00714286
Pensioner Age vs Age


[fampens] Expected number of survivors from death of a pensioners (sr,s,g,xr,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Pensioner sex:
Male
Sex: Female
Group: Custard
A1:B2
0.00714286
Pensioner Age vs Age


[fampens] Expected number of survivors from death of a pensioners (sr,s,g,xr,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Pensioner sex:
Female
Sex: Female
Group: Custard
A1:B2
Pensioner Age vs Age



The final matrix in the section is [included]. This matrix shows whether a given population group is insured. To inform ILO/HEALTH that a population group is insured, users should enter a 1 next to them in this matrix.

Prior knowledge of which groups are included, and which inputs are used to calculate them can save users time and help avoid filling in matrices that will not affect the calculation at the end. Before deciding to fill the [included] matrix, users need to consider that:

- The first group mentioned is *all* active contributors, both those who have fulfilled the waiting period after their first contribution (and thus become insured) and those who have not. Inputting 1 here means that all contributors receive insurance regardless of whether they have fulfilled a waiting period. Another way to look at this is: If the scheme has no waiting periods, users should write 1 in the row for active contributors. If the scheme has waiting periods, they should leave 0 in the first row and input 1 in the second.

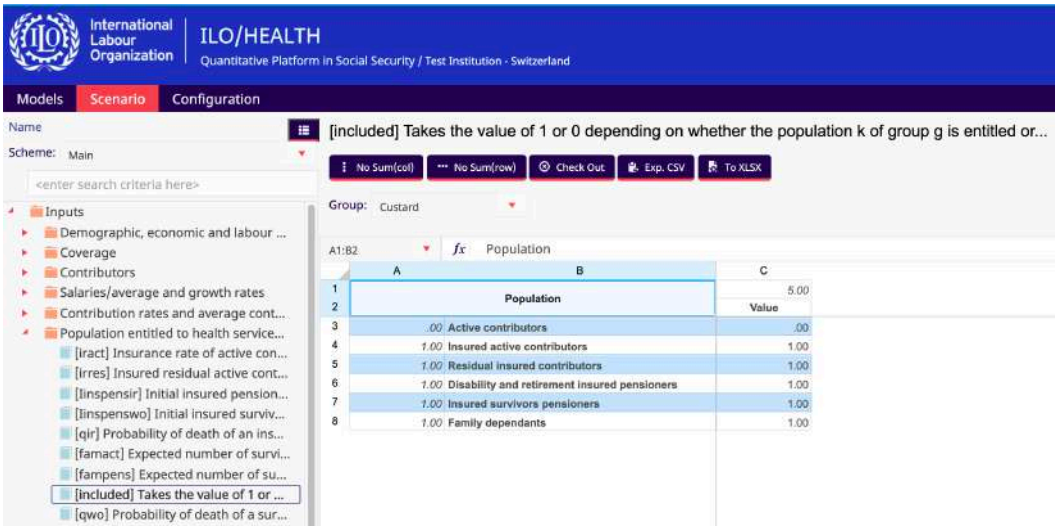
- The second group, insured active contributors, is a subset of the first, so entering 1 in both leads to duplication, for which reason it is advisable to write 1 in either active contributors OR insured active contributors. This number is determined by whether or not the scheme has a waiting period.

- The third group, residual insured contributors, is useful if the scheme has residual insurance periods for inactive contributors. If this is the case, enter 1.

- The next two groups, disability and retirement insured pensioners and Insured survivor pensioners correspond to pensioner coverage. If they do not have access to health insurance, input 0. If they do, enter 1.

- The last option is to extend coverage to family dependants. Again, input 1 if this is the case, otherwise, 0.

➔ For this example, all rows **except the first** need to have 1, the first row stays at 0.



6.2.4. Running the demographic projection

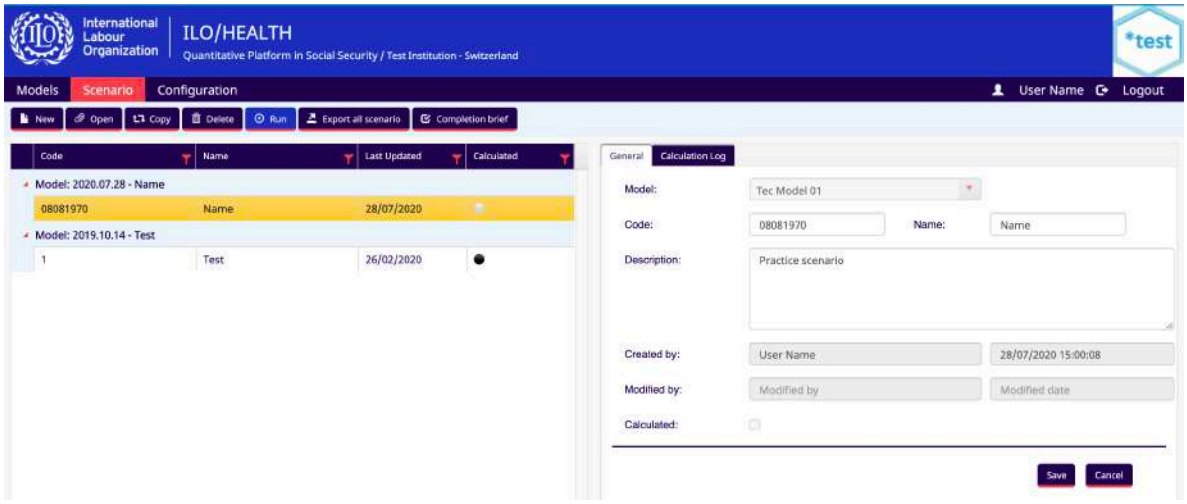
This is an excellent moment to run the demographic projection, for two reasons:

1. All demographic inputs have been completed, so users can practice the Run scenario routine; and

2. If all inputs have been correctly entered, the run will be successful, so users will know that the exercise has been performed correctly so far to continue with the next sections. If not, users can review the steps completed before continuing to add more potential sources of problems for running scenarios.

To run the Scenario, users should go to the Scenario menu, select the Scenario name and then Run. In the options, choose All schemes, and Demographic type of run.

The run takes place remotely and users will be informed by email whether it was successful. If successful, users can check some of the matrices in Demographic outputs. Most of them are intermediate results. The most interesting matrix is [Inssx], which shows the age and sex distribution of all populations with rights to access healthcare services.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
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User Name
Logout
New
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Copy
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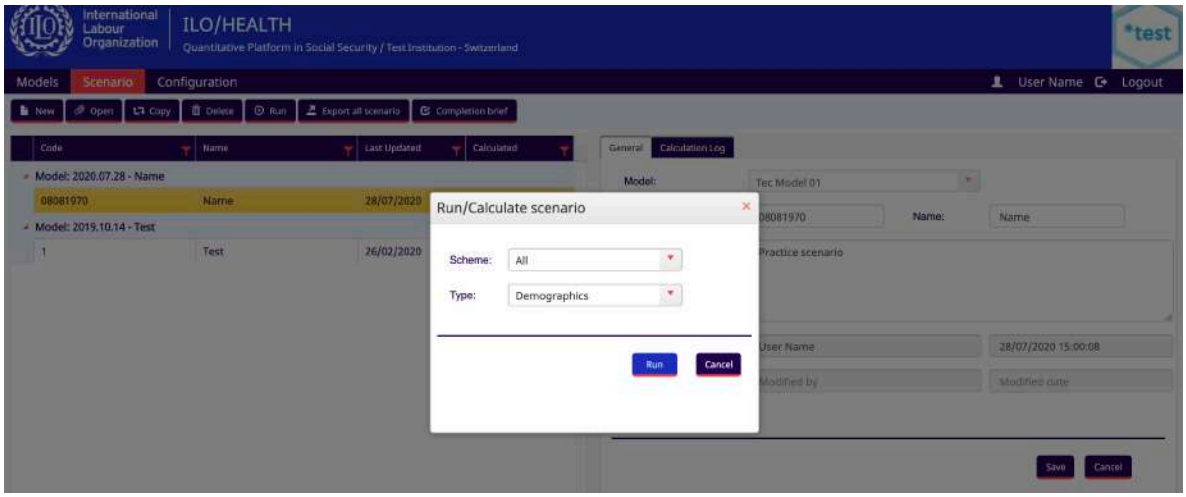
Run
Export all scenario
Completion brief
Code
Name
Last Updated
Calculated
Model: 2020.07.28 - Name
08081970
Name
28/07/2020
Model: 2019.10.14 - Test
1
Test
26/02/2020
General
Calculation Log
Model:
Tec Model 01
Code:
08081970
Name:
Name
Description:
Practice scenario
Created by:
User Name
28/07/2020 15:00:08
Modified by:
Modified by
Modified date
Calculated:
Save
Cancel


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
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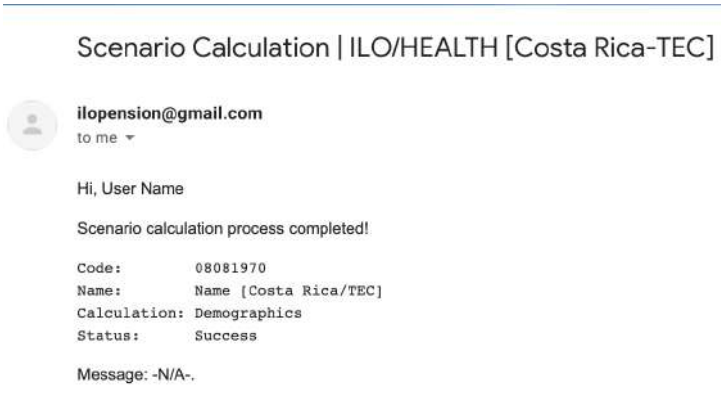
Logout
Run/Calculate scenario
Scheme:
All
Type:
Demographics
Run
Cancel


Run/Calculate scenario
Do you really want to run/calculate the scenario ?
Confirm
Cancel
Run/Calculate scenario
Scenario calculation posted! When finished an email will be send to you.
OK


Scenario Calculation | ILO/HEALTH [Costa Rica-TEC]
ilopension@gmail.com
to me
Hi, User Name
Scenario calculation process completed!
Code: 08081970
Name: Name [Costa Rica/TEC]
Calculation: Demographics
Status: Success
Message: -N/A-.

6.3. Filling in the financial inputs

6.3.1. Filling in the contribution rate matrix and contribution months

To input the contribution rate, in the navigation tree, users should select Inputs > Contribution rates and Average contributions, then the matrix Contribution rate [crg] and check out. The matrix requires the expected contribution rate in place for every year of the projection for each of the population groups in the model.[35] [36]

➔ For this exercise, the contribution rate is 10 per cent of the salaries for all years for the only population group included. Users should fill in the first cell of the matrix with 10 per cent and then drag or copy it into the remaining rows of the matrix.

➔ In the same folder, select the [contmonths], months of contribution per year and change the value to 14 (the default value is 12).

6.3.2. Filling in the matrices for modelling the average wage

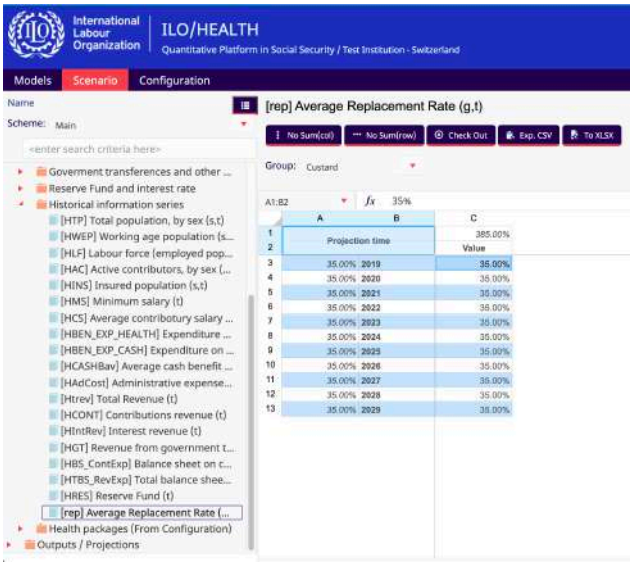
The matrices in this section contain information on replacement rates, salaries and inflation rates.

The matrix on average replacement rate is found in: Inputs > Historical information series.

➔ The average replacement rate, [rep], is assumed to be 35 per cent of the average salary for all pensions over the years.

[35] ILO/HEALTH takes into account the possibility of different contribution rates for each group since different sectors or types of status in employment pay different contribution rates in many countries.

[36] The entries in the matrix correspond to the full legal contribution rate as a percentage of the insurable salary (the salary simulated in ILO/HEALTH). The contribution rate among constituents is not included in the model as it does not usually affect scheme sustainability. The risk that some distributions of obligations will affect the liquidity of the scheme is not considered in most cases; nevertheless, if the risk is high, an alternative is to model effective rather than legal contributions.



In terms of salaries, ILO/HEALTH requests two sets of salaries per age for each sex. One [Isal] is the empirical average monthly salary by age observed over the base year. The other, [ITsal], is the theoretical salary curve, the expected value of the monthly salary by age. These matrices are found in: Inputs > Salaries/average and growth rates.

The empirical salary will be adjusted and applied to wage workers of the base year expected to continue to contribute in the future, while the adjusted theoretical salary applies to future contributors that are not contributing in the base year. Both series are expected to be related, e.g., the latter is calculated using the former.

➔ The initial average monthly salary, [Isal], is 0.0. Check out and in to increase the completion rate.

The model needs the theoretical salary [ITsal] to be a number other than zero to apply to all future contributors. For the example, salary follows the formula below for female and for male, with *x* representing age. Users should try to complete this using the formula in the matrix [ITsal] before continuing.

The steps are as follows:

➔ For males, check out the male matrix from [ITsal], select cell C3, write =30*LN(0.8*B3), and extend the formula to all rows. Check in.

➔ For females, check out the female matrix from [ITsal], select cell C3, write =25*LN(B3), and extend the formula to all rows. Check in.

➔ The average salary growth rate, [asg_in], is 1 per cent per year.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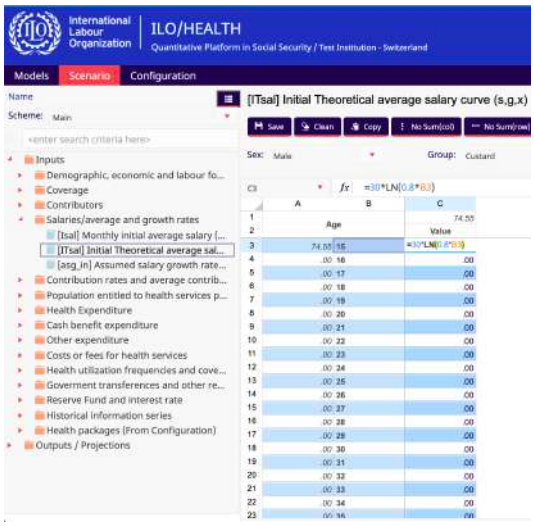
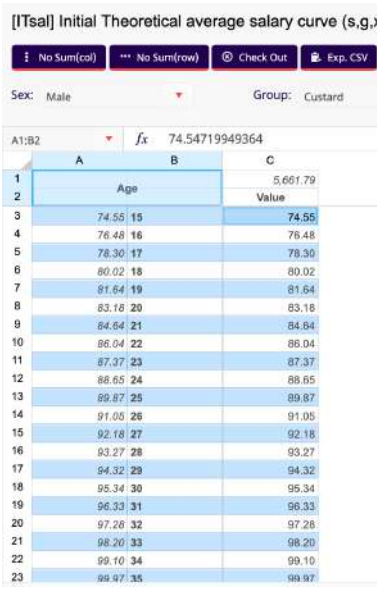
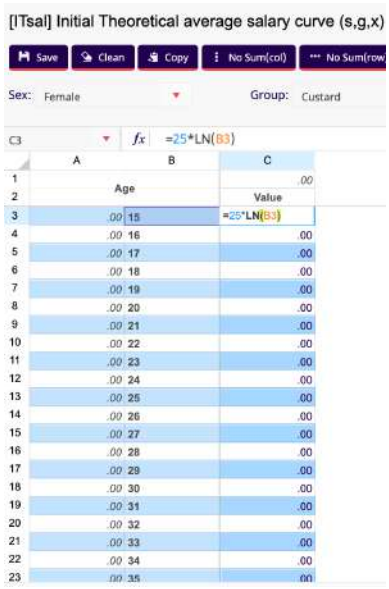
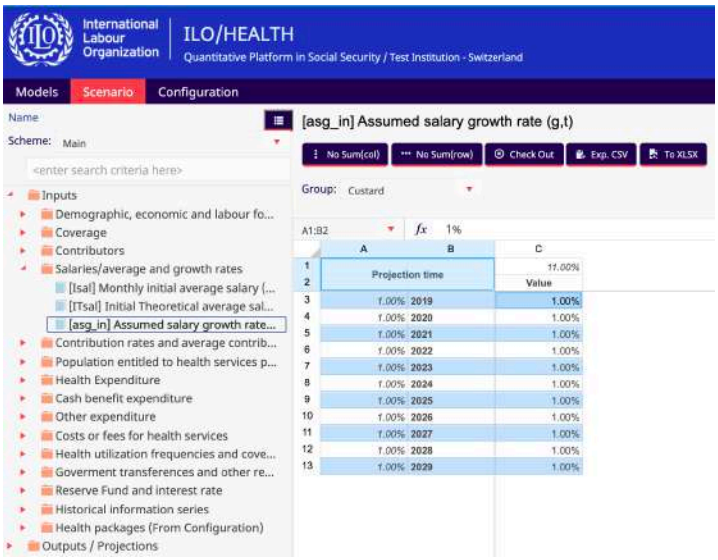
Models
Scenario
Configuration
[Isal] Monthly initial average salary (s,g,x)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
[Isal] Monthly initial average salary (...
[ITsal] Initial Theoretical average sal...
[asg_in] Assumed salary growth rate...
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[ITsal] Initial Theoretical average salary curve (s,g,x)
Save
Clean
Copy
No Sum(col)
No Sum(row)
Sex: Male
Group: Custard
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
[Isal] Monthly initial average salary (...
[ITsal] Initial Theoretical average sal...
[asg_in] Assumed salary growth rate...
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections


[ITsal] Initial Theoretical average salary curve (s,g,
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
Sex: Male
Group: Custard
A1:B2
74.54719949364
Age
Value
5,661.79
74.55
76.48
78.30
80.02
81.64
83.18
84.64
86.04
87.37
88.65
89.87
91.05
92.18
93.27
94.32
95.34
96.33
97.28
98.20
99.10

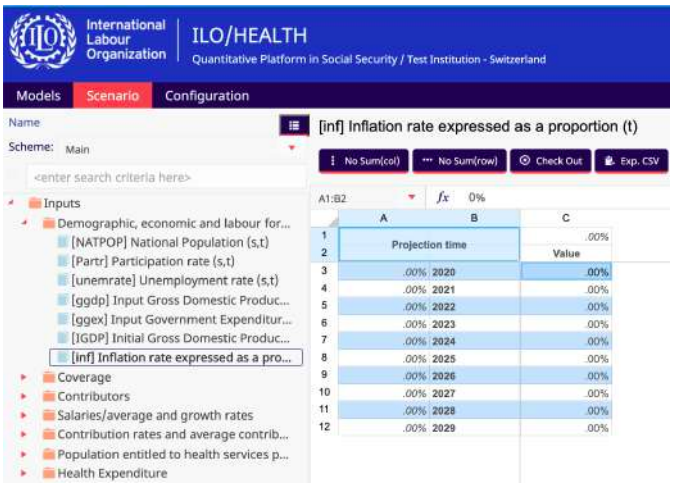

[ITsal] Initial Theoretical average salary curve (s,g,x)
Save
Clean
Copy
No Sum(col)
No Sum(row)
Sex: Female
Group: Custard
C3
=25*LN(B3)
Age
Value
.00
=25*LN(B3)


[ITsal] Initial Theoretical average salary curve
No Sum(col)
No Sum(row)
Check Out
Sex: Female
Group: Custard
A1:B2
67.701255027555
Age
Value
4,919.13
67.70
69.31
70.83
72.26
73.61
74.89
76.11
77.28
78.39
79.45
80.47
81.45
82.40
83.31
84.18
85.03
85.85
86.64
87.41
88.16


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
[asg_in] Assumed salary growth rate (g,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
A1:B2
1%
Projection time
Value
11.00%
1.00% 2019
1.00% 2020
1.00% 2021
1.00% 2022
1.00% 2023
1.00% 2024
1.00% 2025
1.00% 2026
1.00% 2027
1.00% 2028
1.00% 2029
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
[Isal] Monthly initial average salary (...
[ITsal] Initial Theoretical average sal...
[asg_in] Assumed salary growth rate...
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections

The matrix on inflation is found in: Inputs > Demographic, economic and labour force.

➔ Inflation [inf] is assumed to be 0 per cent. This can be interpreted as the whole scenario being formulated in terms of real values. Check out and check in to increase the completion rate.



6.3.3. Filling in the matrix for modelling administrative expenses

The matrix for modelling administrative expenses is found in: Inputs > Other expenditure. This model will use 10 per cent of programme costs.

➔ Fill [adm] in as 10 per cent.

6.3.4. Filling in the matrix for modelling cash benefit expenditures

All the matrices in this section can be found under Inputs > Cash benefit expenditure.

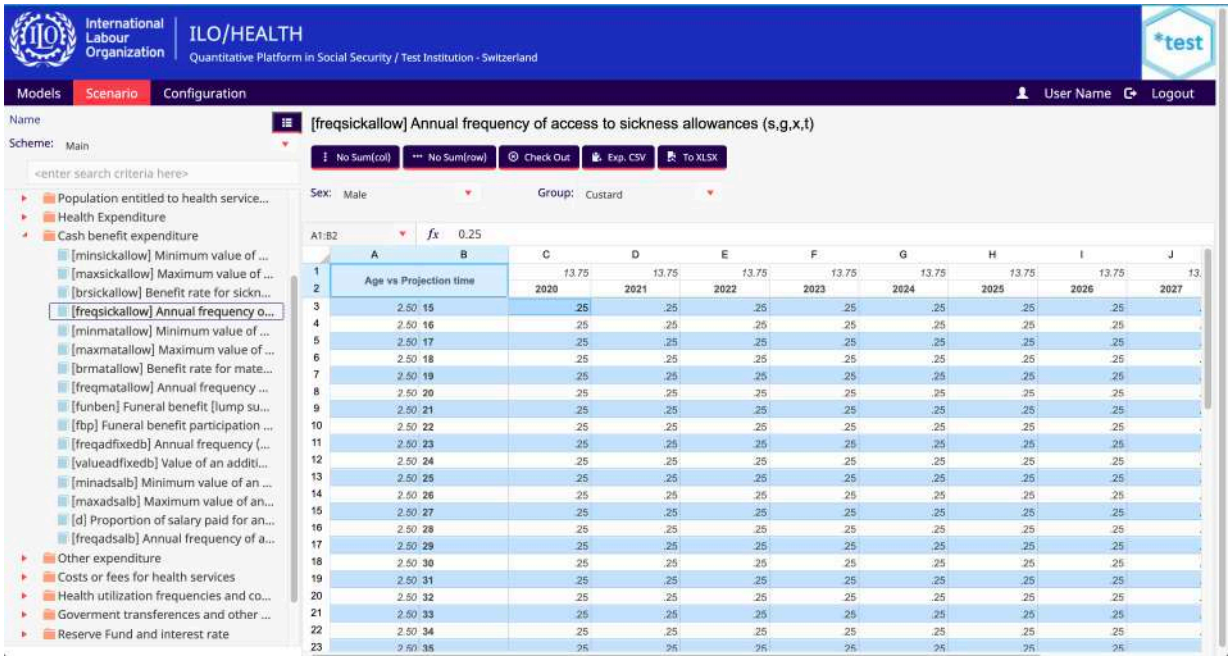
6.3.4.1. *Sickness benefits*

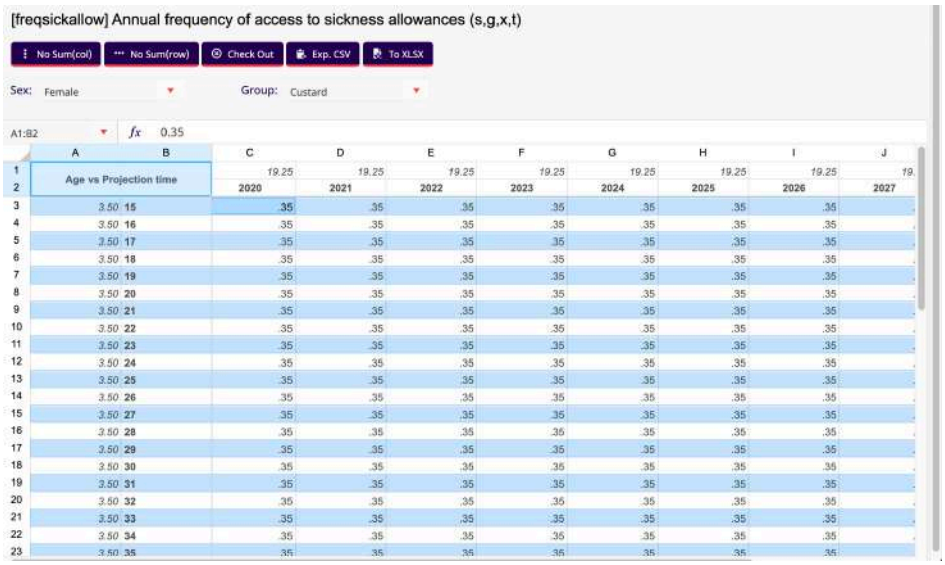
The section on sickness benefits requires users to enter the frequency of sickness allowances by age and sex for the covered population. As sickness benefits mainly help cover salaries for workers who

cannot work because of a health condition, the population covered is active contributors with access to healthcare services.

The frequency of the benefits corresponds to the number of months in a year a person of a given age and sex expects to claim allowances. This value goes in the matrix [freqsickallow]. For simplicity, these figures are 0.25 for all cells of the matrix for males and 0.35 for females.

➔ Input the above values into the male and female matrices, respectively, for the matrix [freqsickallow].

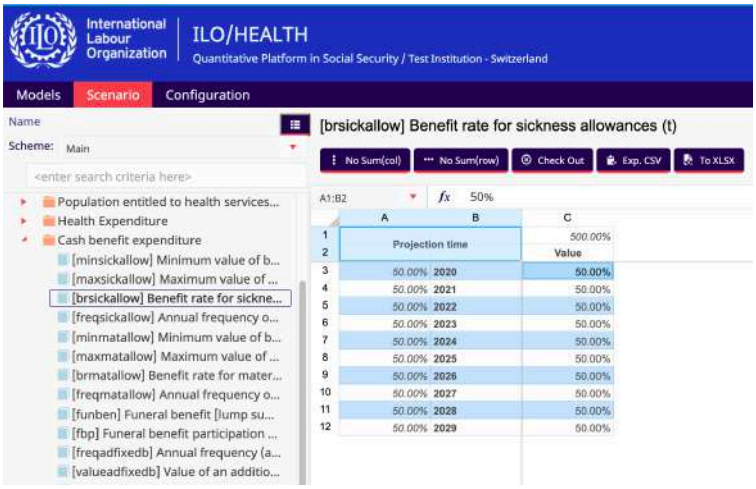




As mentioned, the benefits are intended to replace at least part of the income lost due to sickness. The proportion of lost income to be replaced is usually established by law. This should be input in

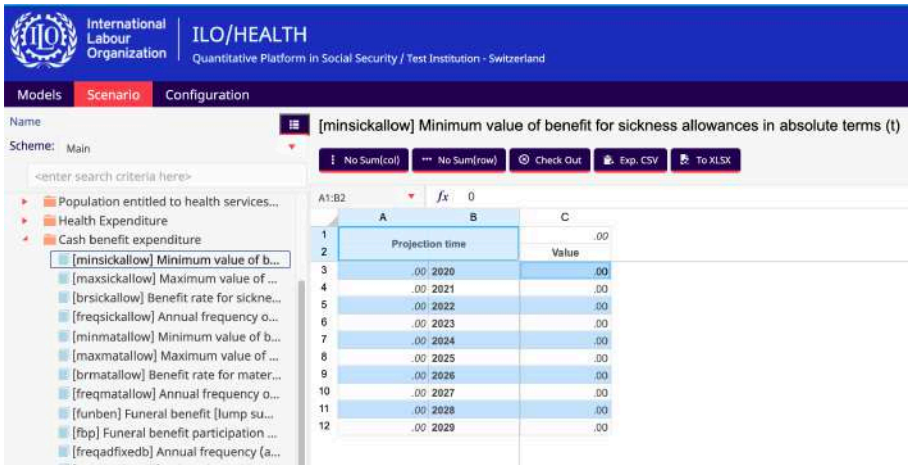
the matrix [brsickallow]. The proportion is the same for all ages and sexes, although it can change per year. For the exercise, the proportion is 50 per cent for all years.

➔ Input 50 per cent for both sexes for the matrix [brsickallow].



The law may limit the value of the benefits to a minimum and/or maximum to guarantee a level of basic survival income and to limit the transfer of resources from the collective pool to people with higher income (thus ensuring that allowances are for basic needs). The minimum and maximum values are input into the matrices [minsickallow] and [maxsickallow], respectively. If they are kept at zero, the formula will disregard them.

➔ For this exercise, they will be kept at 0. Check out and check in to reflect their completion level in the Completion brief.

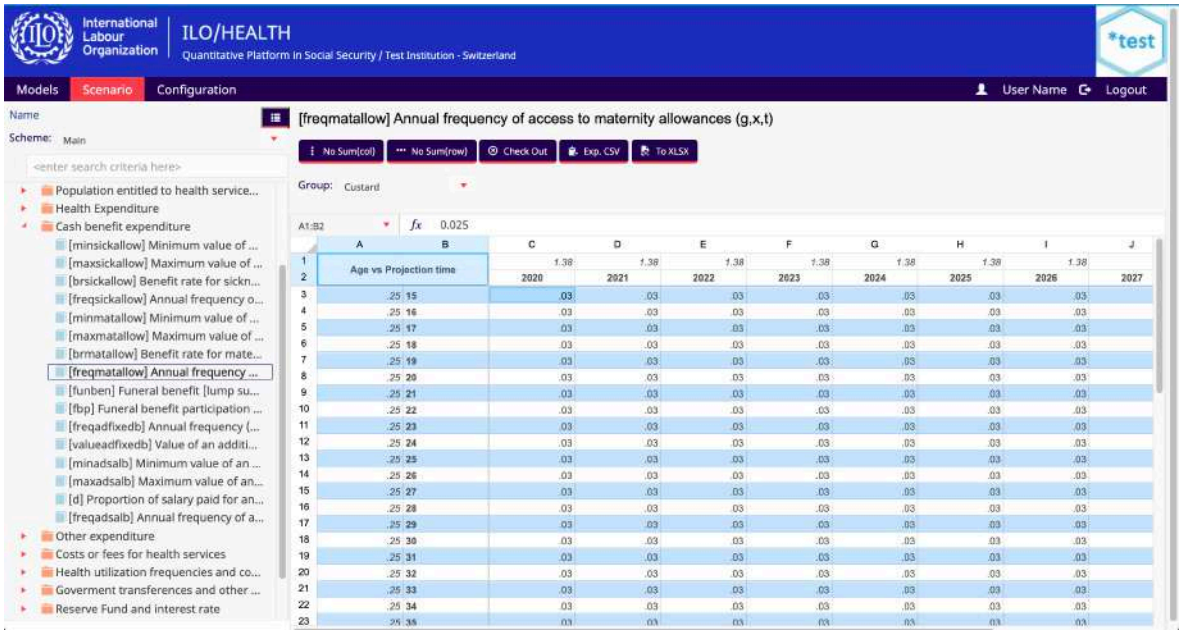


6.3.4.2. *Maternity benefits*

The maternity benefits section requires users to input the frequency of maternity benefits by age and sex for the covered population. As maternity benefits are mainly salary replacements for workers who cannot work because of pregnancy or infant care. The population covered is the group of female active contributors with access to healthcare services.

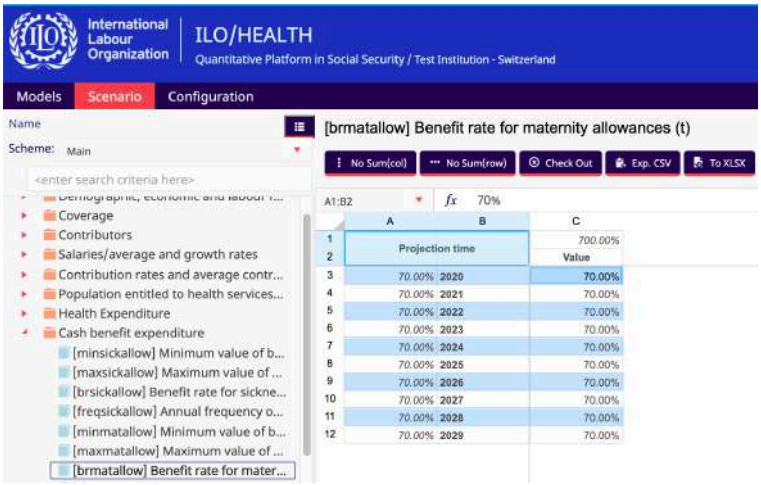
The frequency of the benefits corresponds to the number of months in a year a person of a given age expects to receive benefits. This value is entered into the matrix [freqmatallow].

➔ For this exercise, users should enter 0.025 in all cells of the [freqmatallow] matrix.



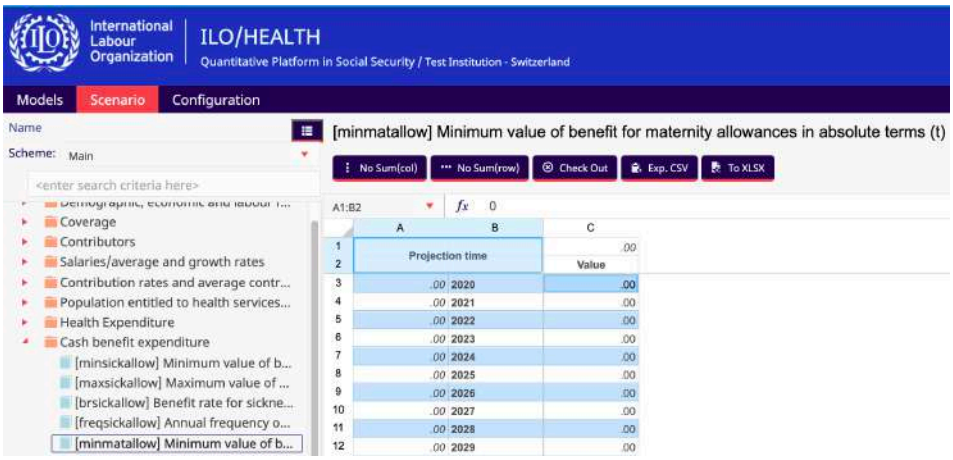
As mentioned, maternity benefits are intended to replace at least part of the income lost due to maternity. The proportion of income lost to be replaced is usually established by law and input in the matrix [brmatallow]. The proportion is the same for all ages and sexes, although it can change per year. For this exercise, the proportion is 70 per cent for all years.

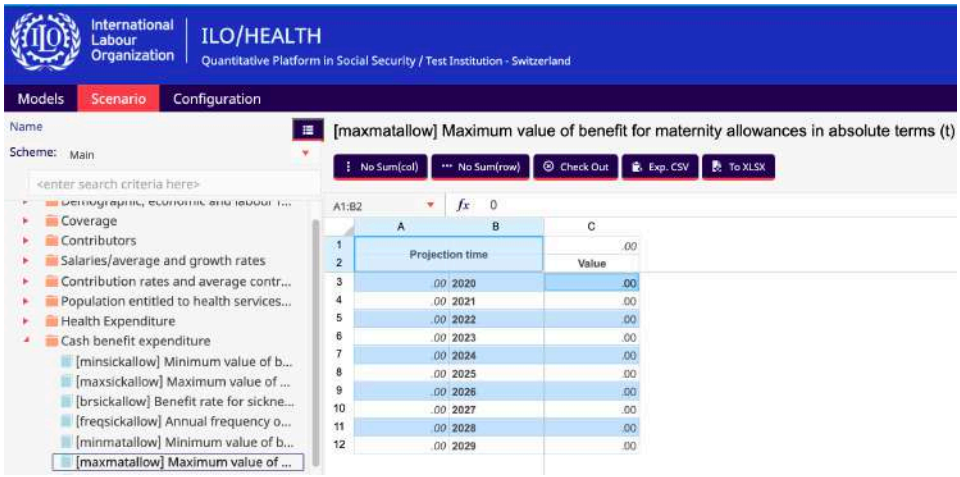
➔ Input 70 per cent for the matrix [brmatallow].



The law may limit the value of the benefits to a minimum and/or maximum to guarantee a level of basic survival income and to limit the transfer of resources from the collective pool to people with higher income (thus ensuring that allowances are for basic needs). The minimum and maximum values are input into the matrices [minsickallow] and [maxsickallow], respectively. If they are kept at zero, the formula will disregard them.

➔ For this exercise, they will be kept at 0. Check out and check in to reflect their completion level in the Completion brief.

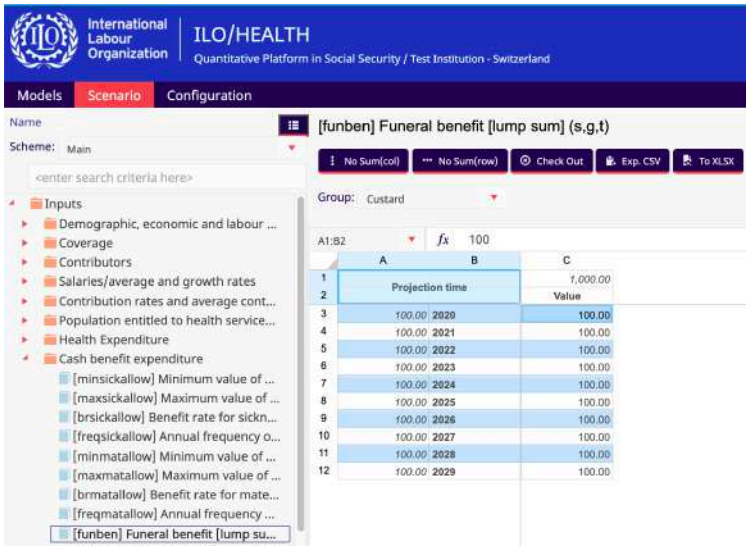




6.3.4.3. *Funeral benefit*

The funeral benefits are different from other cash benefits. First, because instead of a salary replacement, this benefit is a fixed amount for everyone entitled to it, paid as a lump sum for all funerals, regardless of the age and sex of the deceased. It is fixed in the matrix [funben]. This exercise will use 100 for all years.

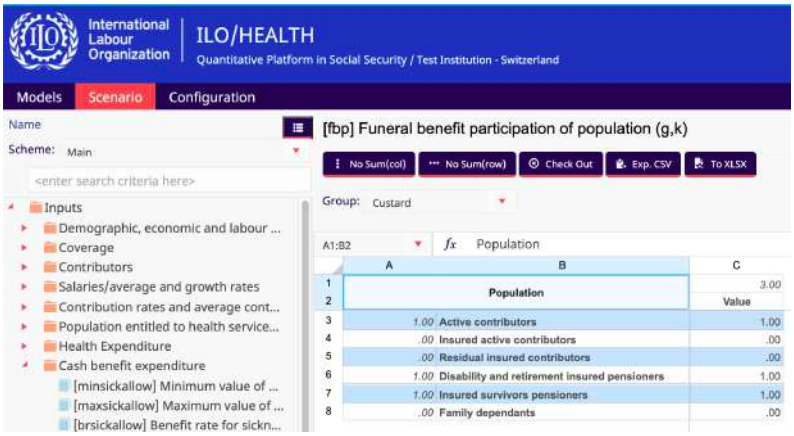
➔ Fill [funben] in with 100 for all years and check in to reflect the completion rate in the Completion brief.



Additionally, the funeral benefit does not require a frequency for its calculation; rather, it uses the mortality rates provided in the demographic inputs.

Besides the mortality rates, the calculation requires indicating which groups of people estimated in the demographic section have access to funeral benefits. That is done in the matrix [fbp], which is similar to the matrix [included] and is read in the same way; however, instead of healthcare services it refers to funeral lump sums.

➔ In this calculation, users should write 1 in the first row, 0 in the second and third, 1 in the fourth and fifth and 0 in the sixth. One exercise for users is to interpret the meaning of this arrangement. For example, if an inactive contributor with access to healthcare services dies, does his or her family receive a funeral benefit? What about in the case that the spouse of an active contributor dies?

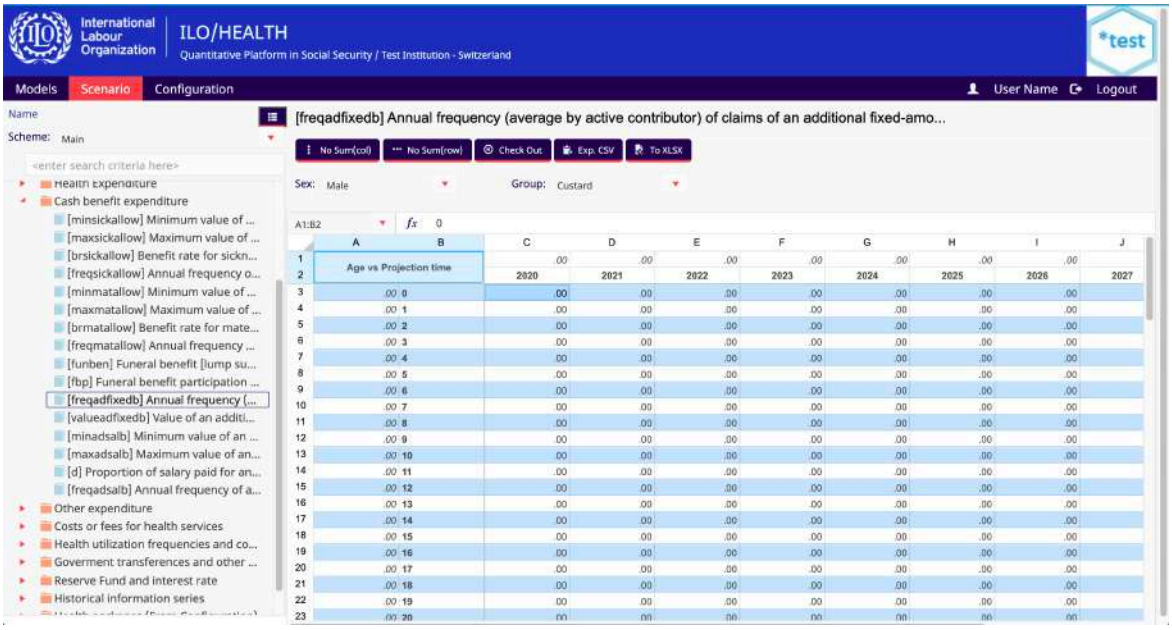


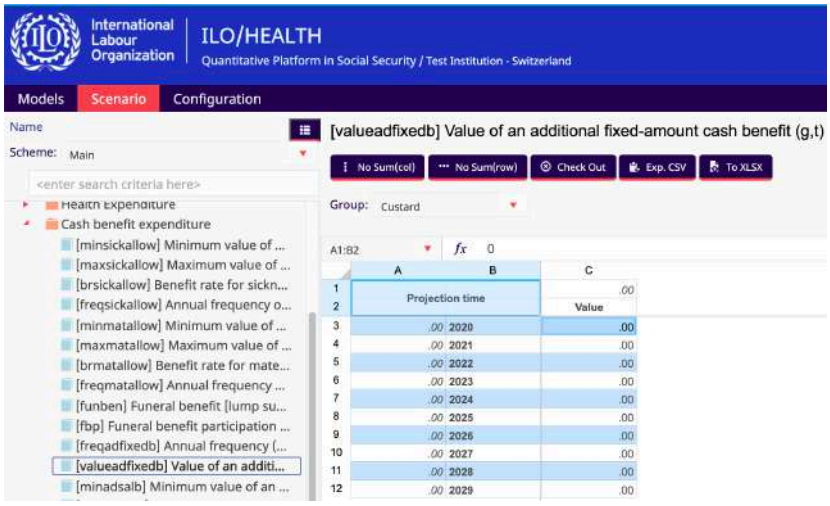
6.3.4.4. *Additional benefits*

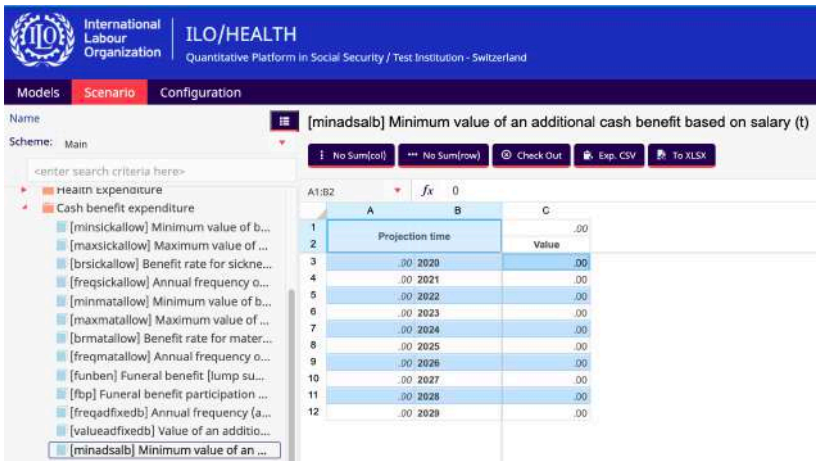
ILO/HEALTH allows users to model another ad hoc cash benefit in addition to the ones discussed above. The benefit consists of the sum of two parts: one consisting of a lump sum whose value is input into the matrix [valueadfixedb] and whose frequency per age and sex is input in [freqadfixedb]. The other part is proportional to the salary of the insured active contributors.

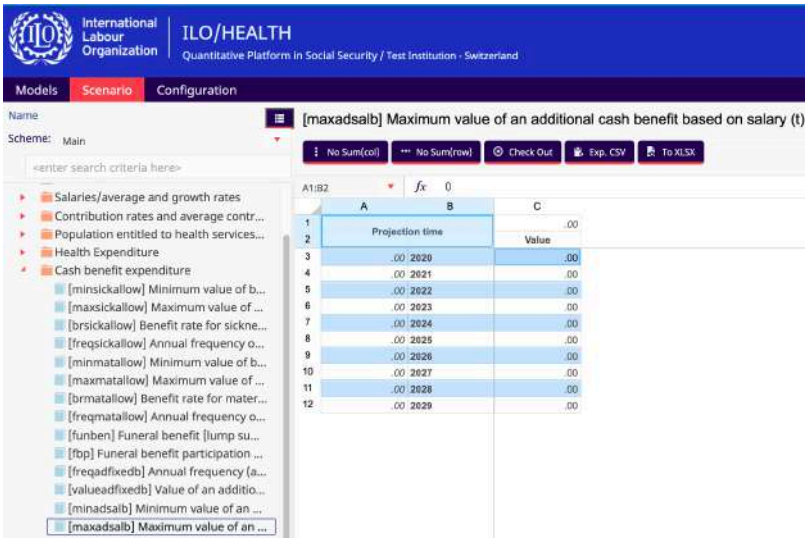
The replacement rate (equivalent to the 'br' in the first two benefits) is input into the matrix [d] while the frequency per age and sex is input into the matrix [freqadsalb]. The minimum and maximum function is the same as in the case of the maternity and sickness (it only applies to the proportional part).

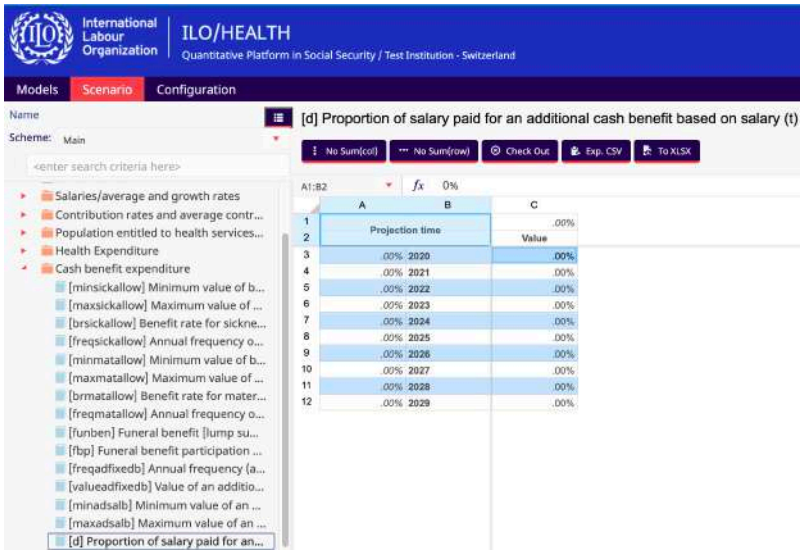
➔ This exercise assumes that there are no additional benefits and all the matrices including [minadsalb] and [maxadsalb] are filled in with zeros. Users can check out and check in all the ad hoc benefit matrices above to show progress in the Completion brief.

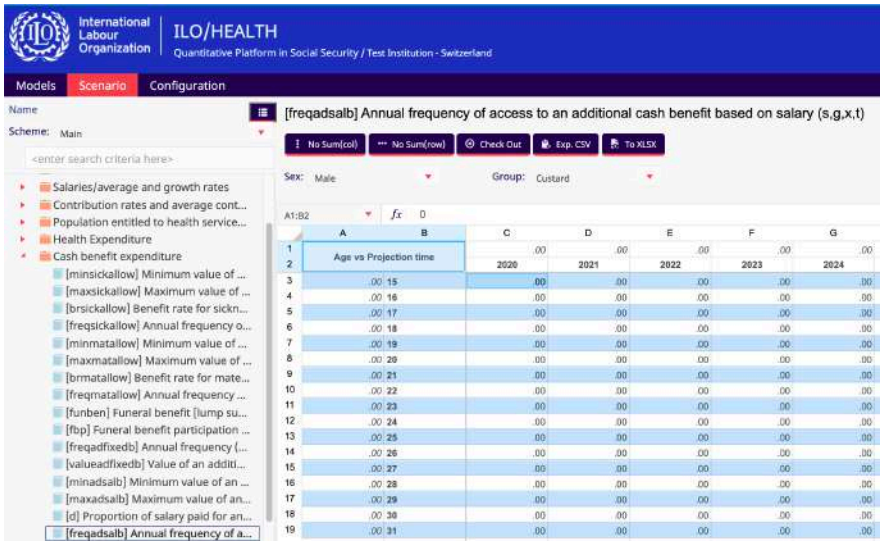

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
[freqadfixedb] Annual frequency (average by active contributor) of claims of an additional fixed-amo...
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027
Health expenditure
Cash benefit expenditure
[minsickallow] Minimum value of ...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickn...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of ...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mate...
[freqmatallow] Annual frequency ...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (...
[valueadfixedb] Value of an additi...
[minadsalb] Minimum value of an ...
[maxadsalb] Maximum value of an...
[d] Proportion of salary paid for an...
[freqadsalb] Annual frequency of a...
Other expenditure
Costs or fees for health services
Health utilization frequencies and co...
Goverment transferences and other ...
Reserve Fund and interest rate
Historical information series


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
[valueadfixedb] Value of an additional fixed-amount cash benefit (g,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Projection time
Value
Health expenditure
Cash benefit expenditure
[minsickallow] Minimum value of ...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickn...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of ...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mate...
[freqmatallow] Annual frequency ...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (...
[valueadfixedb] Value of an additi...
[minadsalb] Minimum value of an ...


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
[minadsalb] Minimum value of an additional cash benefit based on salary (t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Projection time
Value
Health expenditure
Cash benefit expenditure
[minsickallow] Minimum value of b...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickne...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of b...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mater...
[freqmatallow] Annual frequency o...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (a...
[valueadfixedb] Value of an additio...
[minadsalb] Minimum value of an ...


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Salaries/average and growth rates
Contribution rates and average contr...
Population entitled to health services...
Health Expenditure
Cash benefit expenditure
[minsickallow] Minimum value of b...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickne...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of b...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mater...
[freqmatallow] Annual frequency o...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (a...
[valueadfixedb] Value of an additio...
[minadsalb] Minimum value of an ...
[maxadsalb] Maximum value of an ...
[maxadsalb] Maximum value of an additional cash benefit based on salary (t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
A1:B2
0
Projection time
Value
.00 2020
.00 2021
.00 2022
.00 2023
.00 2024
.00 2025
.00 2026
.00 2027
.00 2028
.00 2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Salaries/average and growth rates
Contribution rates and average contr...
Population entitled to health services...
Health Expenditure
Cash benefit expenditure
[minsickallow] Minimum value of b...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickne...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of b...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mater...
[freqmatallow] Annual frequency o...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (a...
[valueadfixedb] Value of an additio...
[minadsalb] Minimum value of an ...
[maxadsalb] Maximum value of an ...
[d] Proportion of salary paid for an...
[d] Proportion of salary paid for an additional cash benefit based on salary (t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
A1:B2
0%
Projection time
Value
.00% 2020
.00% 2021
.00% 2022
.00% 2023
.00% 2024
.00% 2025
.00% 2026
.00% 2027
.00% 2028
.00% 2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Salaries/average and growth rates
Contribution rates and average cont...
Population entitled to health service...
Health Expenditure
Cash benefit expenditure
[minsickallow] Minimum value of ...
[maxsickallow] Maximum value of ...
[brsickallow] Benefit rate for sickn...
[freqsickallow] Annual frequency o...
[minmatallow] Minimum value of ...
[maxmatallow] Maximum value of ...
[brmatallow] Benefit rate for mate...
[freqmatallow] Annual frequency ...
[funben] Funeral benefit [lump su...
[fbp] Funeral benefit participation ...
[freqadfixedb] Annual frequency (...
[valueadfixedb] Value of an additi...
[minadsalb] Minimum value of an ...
[maxadsalb] Maximum value of an...
[d] Proportion of salary paid for an...
[freqadsalb] Annual frequency of a...
[freqadsalb] Annual frequency of access to an additional cash benefit based on salary (s,g,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0
Age vs Projection time
2020
2021
2022
2023
2024
.00 15
.00 16
.00 17
.00 18
.00 19
.00 20
.00 21
.00 22
.00 23
.00 24
.00 25
.00 26
.00 27
.00 28
.00 29
.00 30
.00 31

6.3.5. Filling in healthcare packages

Most of the matrices in this section are found in Inputs > Health Expenditure.

6.3.5.1. *Modelling budget allocations*

All the packages modelled as budget allocations require an initial value that corresponds to the amount of expenditure on the package in the base year for the calculation, [IEXP]. The amount can theoretically be zero, except in the case of health packages whose method of payment is (MP1) Budgetary Allocation Initial Expenditure and Assumed Expenditure Growth as in the case of Podo in the example.[37]

➔ For the example, users should input 1 000 000 for all three health packages listed in the matrix [IEXP]. The three packages listed are those whose payment methods are (MP1) Budgetary Allocation Initial Expenditure and Assumed Expenditure Growth, (MP2) Budgetary Allocation Expenditure as a percentage of GDP and (MP3) Budgetary Allocation Expenditure as a percentage of GEX, which are all types of budget allocation.

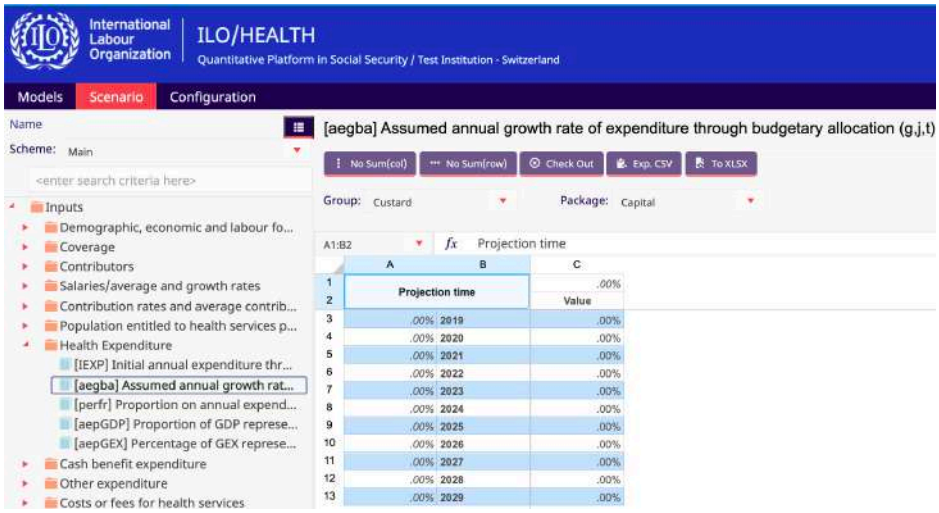
6.3.5.1.1. Modelling budget allocations by growth rate

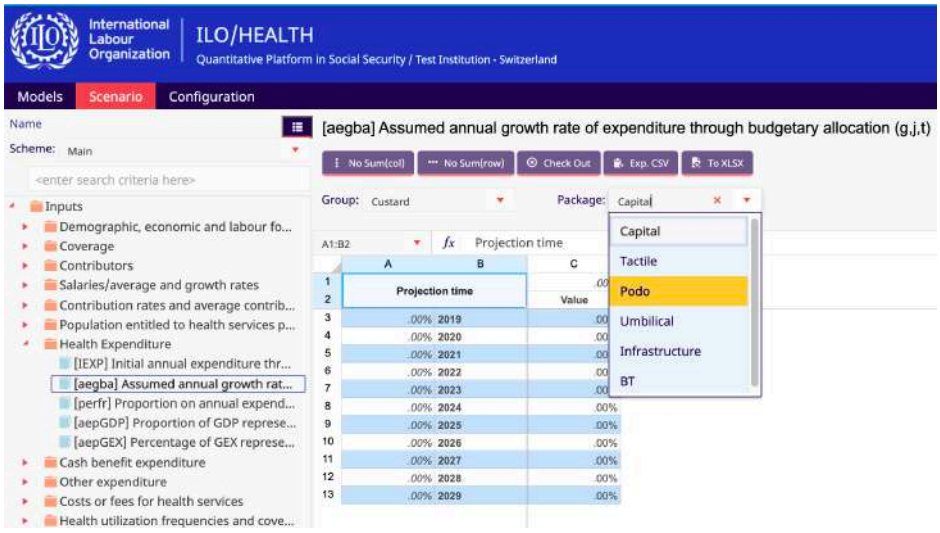
Moving towards the matrix [aegba], in the default selection of matrix, all options, including Check Out, are disabled. This occurs because the default selection of Package is in Capital, a health package that does not need the matrix [aegba] to be calculated. Users can change the package in the dropdown menu. Users will find Podo is the only package in which the options are not disabled.[38]

➔ When users choose Podo as the package, they should enter 1 per cent for the entire period and then check in.

[37] If the initial value of the expenditure in the package is zero, there is no growth rate that will make the expenditure in the future deviate from zero, so the package cannot have any expenditures.

[38] If users do not include any package paid by the method (MP1) Budgetary Allocation Initial Expenditure and Assumed Expenditure Growth, the matrix will appear, but it will be unavailable for editing. That may occur with any of the matrices in this section.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
[IEXP] Initial annual expenditure thr...
[aegba] Assumed annual growth rat...
[perfr] Proportion on annual expend...
[aepGDP] Proportion of GDP represe...
[aepGEX] Percentage of GEX represe...
Cash benefit expenditure
Other expenditure
Costs or fees for health services
[aegba] Assumed annual growth rate of expenditure through budgetary allocation (g,j,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Package: Capital
A1:B2
Projection time
Projection time
Value
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
[IEXP] Initial annual expenditure thr...
[aegba] Assumed annual growth rat...
[perfr] Proportion on annual expend...
[aepGDP] Proportion of GDP represe...
[aepGEX] Percentage of GEX represe...
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[aegba] Assumed annual growth rate of expenditure through budgetary allocation (g,j,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Package: Capital
Capital
Tactile
Podo
Umbilical
Infrastructure
BT
A1:B2
Projection time
Projection time
Value
2019
2020
2021
2022
2023
2024
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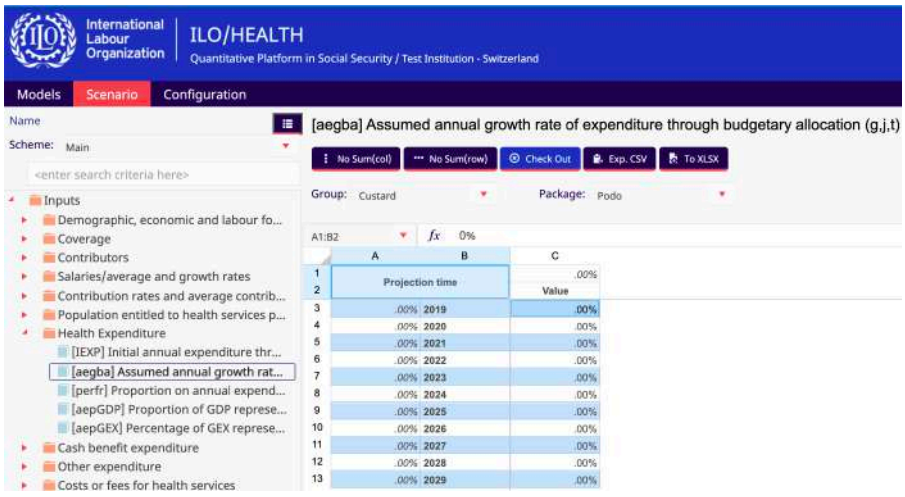
2026
2027
2028
2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
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Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
[IEXP] Initial annual expenditure thr...
[aegba] Assumed annual growth rat...
[perfr] Proportion on annual expend...
[aepGDP] Proportion of GDP represe...
[aepGEX] Percentage of GEX represe...
Cash benefit expenditure
Other expenditure
Costs or fees for health services
[aegba] Assumed annual growth rate of expenditure through budgetary allocation (g,j,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Package: Podo
A1:B2
0%
Projection time
Value
2019
2020
2021
2022
2023
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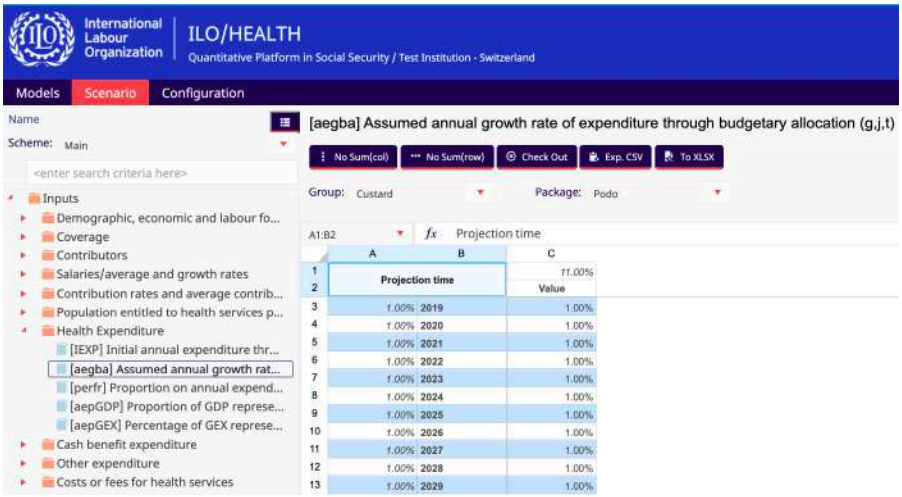
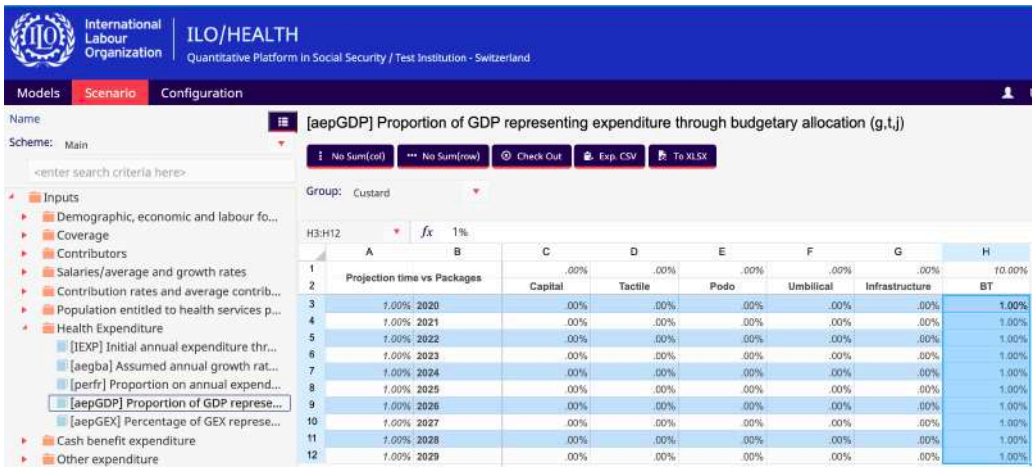


6.3.5.1.2. Modelling budget allocations as a proportion of GDP

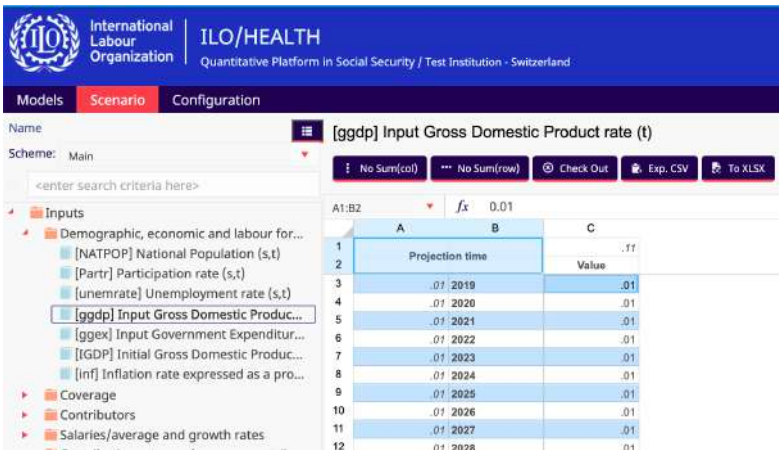
In the same folder, the matrix [aepGDP] shows a table with all the packages. This matrix requires users to input the packages' expected value as percentage of GDP. In this example, users have one package that uses (MP2) Budgetary Allocation Expenditure as a percentage of GDP as the method of payment: BT.

➔ Users should check out, fill in the values with 1 per cent only for BT (or similar packages in their own schemes) and check in. Later, users can confirm that the values input in other columns have no impact on the final results.



In Inputs > Demographic, economic and labour force, the calculation of GDP and Government expenditure uses the initial value of GDP, [IGDP], for the year prior to the start of the projection. A growth rate is also input for the GDP over the projection period, [ggdp]. The proportion of GDP representing expenditure through budgetary allocation, [aepgdp], is also input, if applicable.

➔ Initial GDP [IGDP] is 100 000 000 currency units, and GDP growth [ggdp] is projected at 1 per cent annually. Enter these values in the respective matrices.



6.3.5.1.3. Modelling budget allocations as a proportion of government expenditure

In Inputs > Health Expenditure again, the matrix [aepGEX] shows a table with all the packages. This matrix requires users to input the packages' expected value as a percentage of GEX. In this example, users have one package that uses (MP3) Budgetary Allocation Expenditure as a percentage of government expenditure as the payment method of: Infrastructure.

➔ Users should check out [aepGEX], enter 5 per cent only for Infrastructure (or similar packages) and check in. Users can then confirm that values input in other columns have no impact on the final results.

Government Expenditure [ggex] is 20 per cent of GDP over the whole period. It is found in: Inputs > Demographic, economic and labour force.

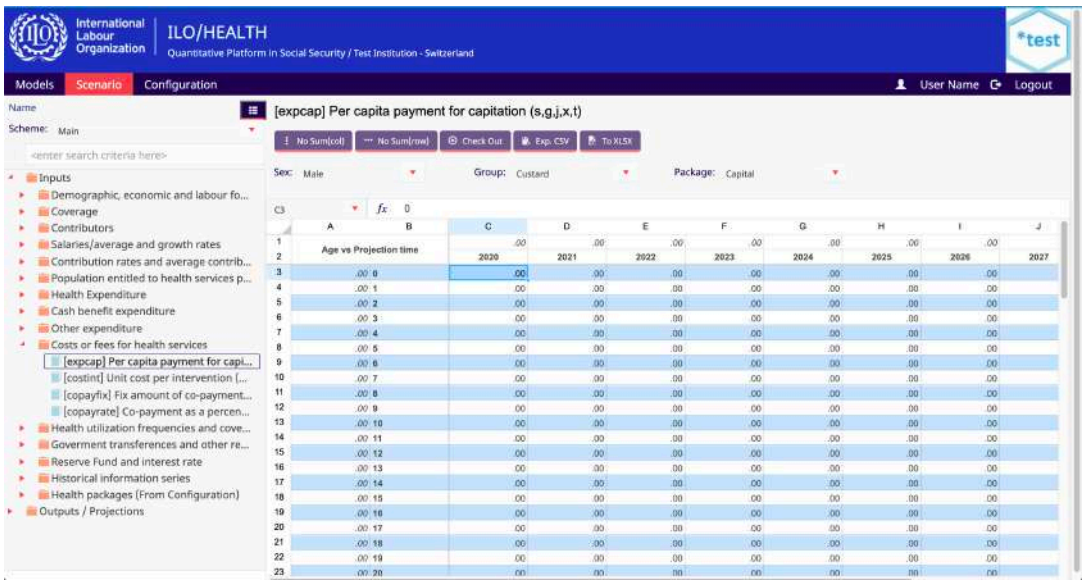
➔ Fill in [ggex] with 20 per cent for all years.

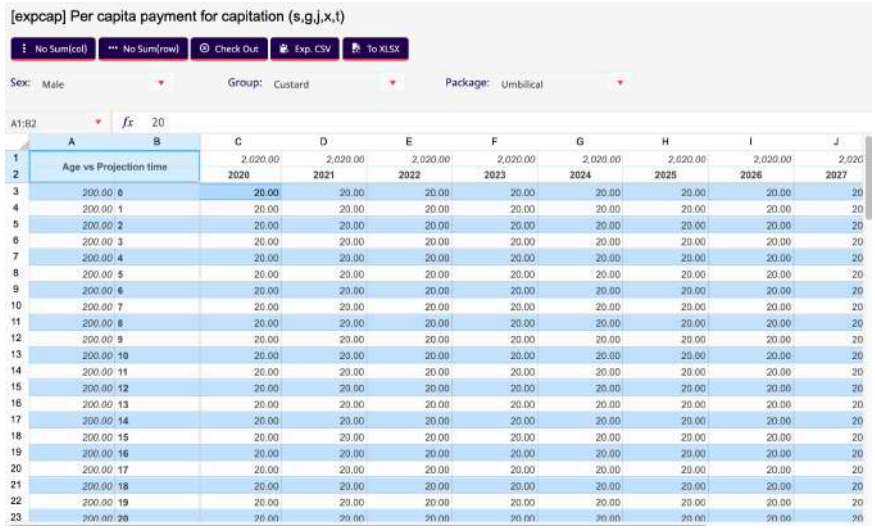
6.3.6. Modelling capitation expenditure

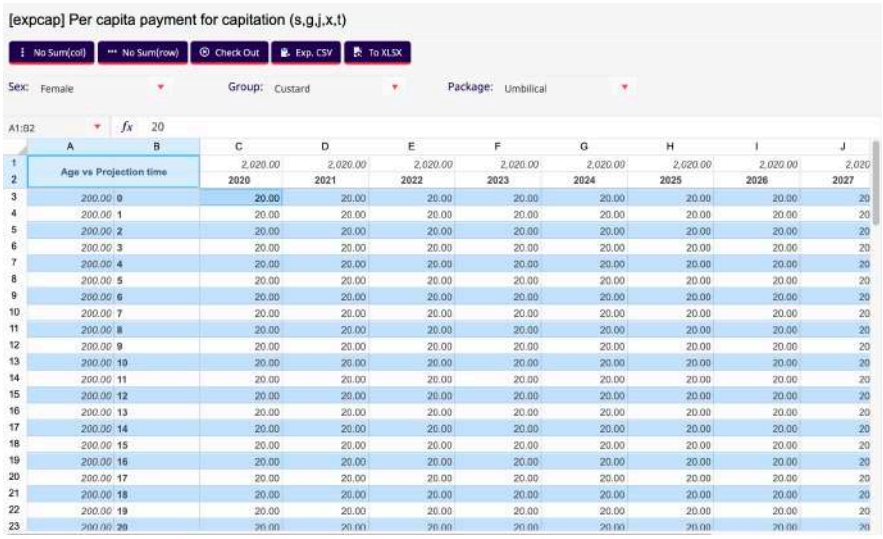
The matrix on per capita payment for capitation, [expcap], is found in Inputs > Costs or fees for health services.

In the matrix [expcap], the packages paid by capitation are the only ones for which the Check Out option is available. Users need to identify the packages paid by (MP4) Capitation in the matrix and then input the yearly capitation cost paid per person of each group covered by capitation by age and sex.

➔ The example assumes that the costs are 20 for every individual covered regardless of age and sex. Users should check out, fill in the [expcap] matrix with 20 and check in **for both sexes** in the Umbilical package – the only one available.



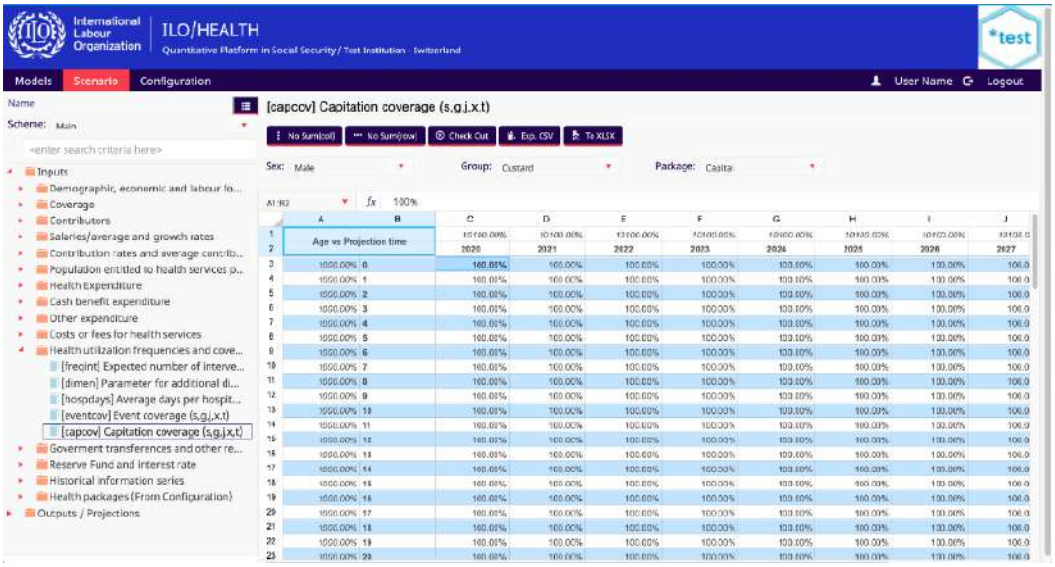




The matrices on capitation coverage, [capcov], and event coverage, [eventcov], are found in Inputs > Health utilization frequencies and coverage.

This matrix contains the percentage of the population whose corresponding healthcare interventions are paid by capitation. In this example, the default value of 100 per cent is used for all packages as there are no healthcare interventions offered by (MP4) Capitation, by (MP5) Health intervention in the general case, or by (MP6) Health intervention hospitalization simultaneously. If some individuals' consultations are paid by Capitation and others by Health intervention, users will have to use [capcov] and [eventcov] to complement both rates to show the expected distributions between payment methods.

➔ This exercise skips these matrices, so users only need to check out and check in these matrices for both sexes for all packages to increase the completion rate.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
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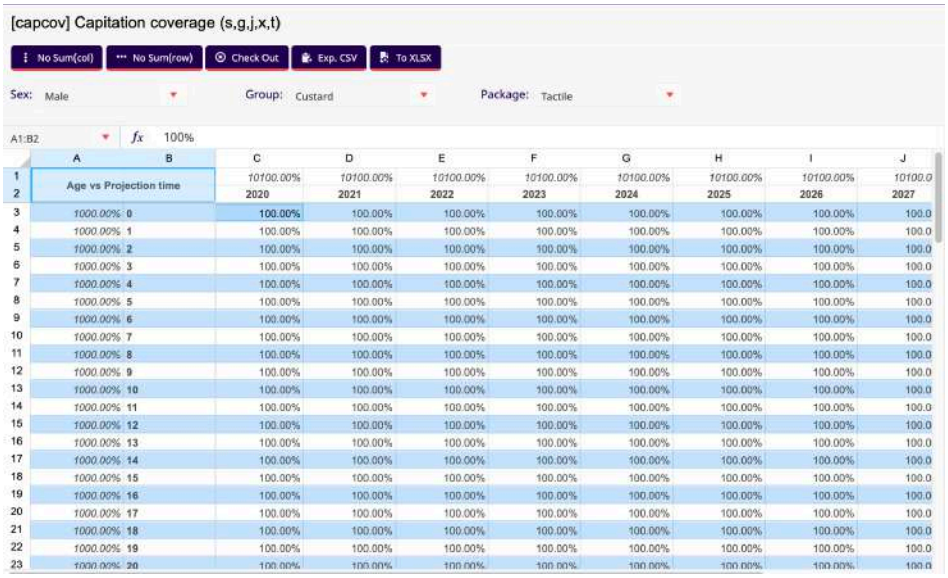
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[freqint] Expected number of interve...
[dimen] Parameter for additional di...
[hospdays] Average days per hospit...
[eventcov] Event coverage (s,g,j,x,t)
[capcov] Capitation coverage (s,g,j,x,t)
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[capcov] Capitation coverage (s,g,j,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Casita
A1:B2
100%
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027


[capcov] Capitation coverage (s,g,j,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Tactile
A1:B2
100%
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027

[capcov] Capitation coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Podo

A1:B2 fx 100%

	A	B	C	D	E	F	G	H	I	J
1			10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2	Age vs Projection time		2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
15	1000.00%	12	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
16	1000.00%	13	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
23	1000.00%	20	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

[capcov] Capitation coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Umbilical

A1:B2 fx 100%

	A	B	C	D	E	F	G	H	I	J
1			10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2	Age vs Projection time		2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
15	1000.00%	12	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
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17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
23	1000.00%	20	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

[capcov] Capitation coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: BT

A1:B2 fx 100%

	A	B	C	D	E	F	G	H	I	J
1			10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2	Age vs Projection time		2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
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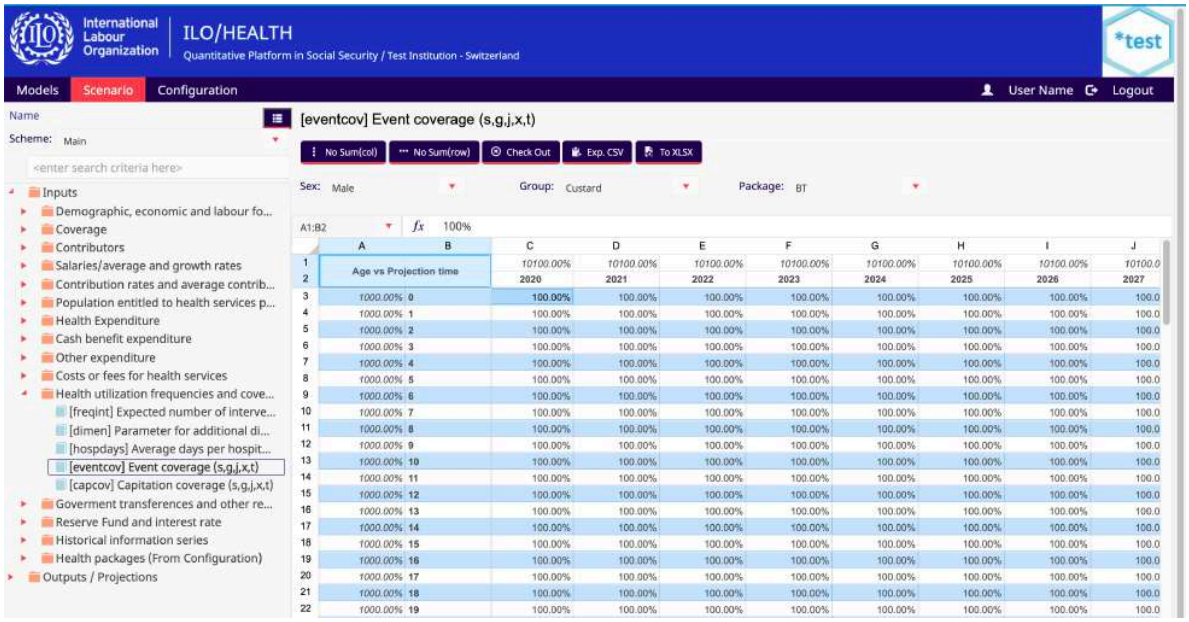
17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
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Models
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Configuration
User Name
Logout
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Scheme: Main
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Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
Health utilization frequencies and cove...
[freqint] Expected number of interve...
[dimen] Parameter for additional di...
[hospdays] Average days per hospit...
[eventcov] Event coverage (s,g,j,x,t)
[capcov] Capitation coverage (s,g,j,x,t)
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[eventcov] Event coverage (s,g,j,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: BT
A1:B2
100%
Age vs Projection time
2020
2021
2022
2023
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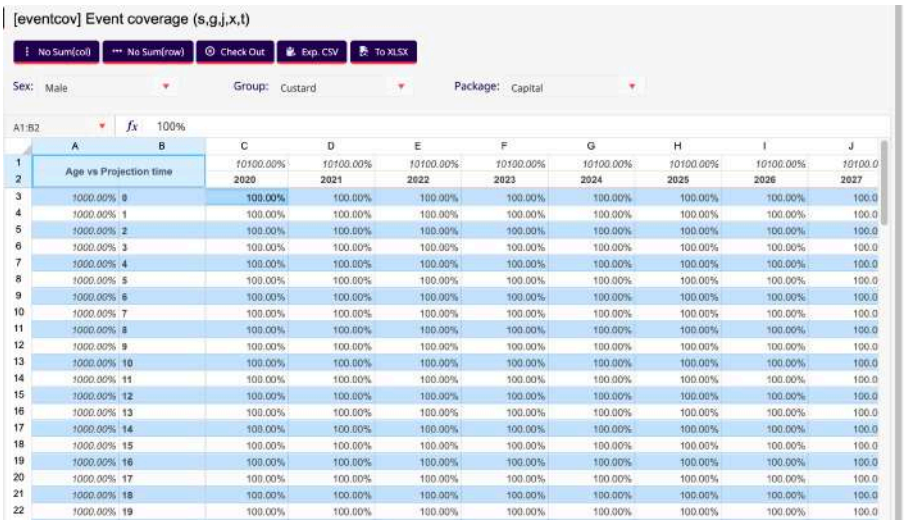
2025
2026
2027


[eventcov] Event coverage (s,g,j,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
A1:B2
100%
Age vs Projection time
2020
2021
2022
2023
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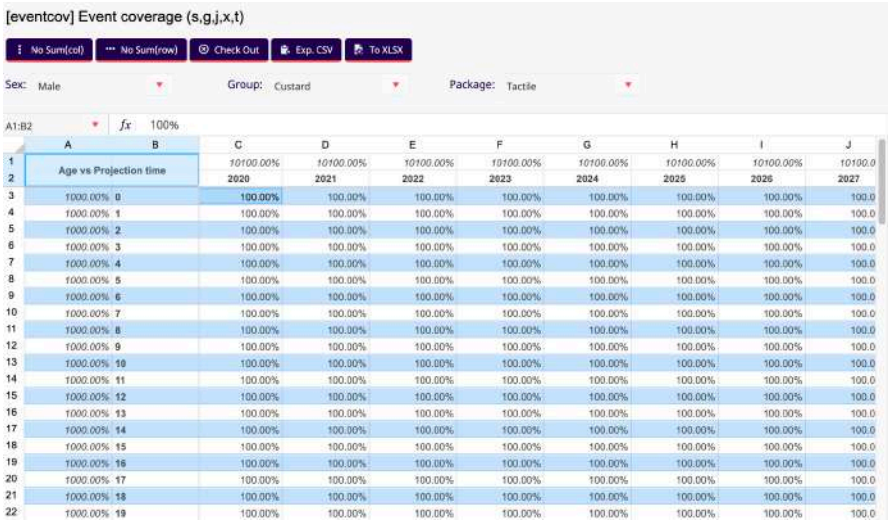
2027


[eventcov] Event coverage (s,g,j,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Tactile
A1:B2
100%
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027

[eventcov] Event coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Podo

A1:B2 fx 100%

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2			2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
15	1000.00%	12	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
16	1000.00%	13	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

[eventcov] Event coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Umbilical

A1:B2 fx 100%

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2			2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
15	1000.00%	12	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
16	1000.00%	13	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

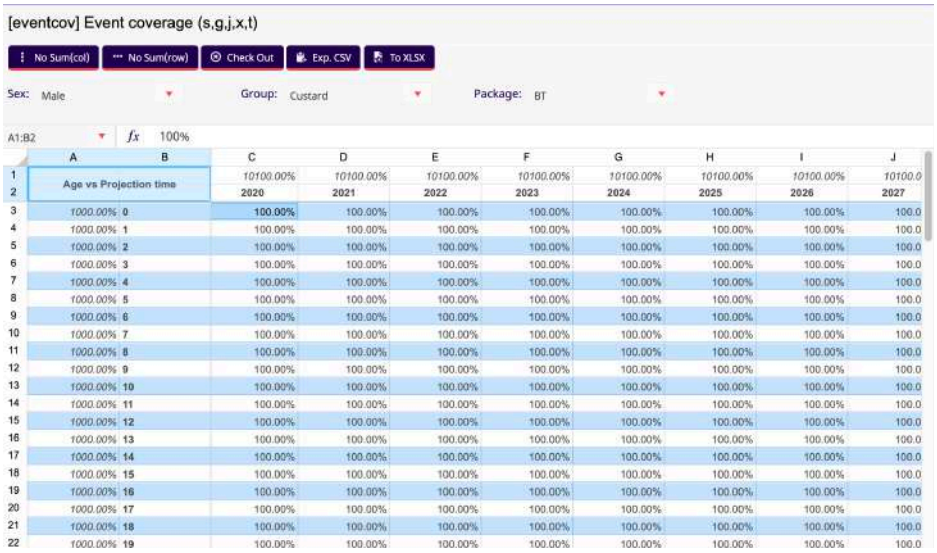
[eventcov] Event coverage (s,g,j,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Infrastructure

A1:B2 fx 100%

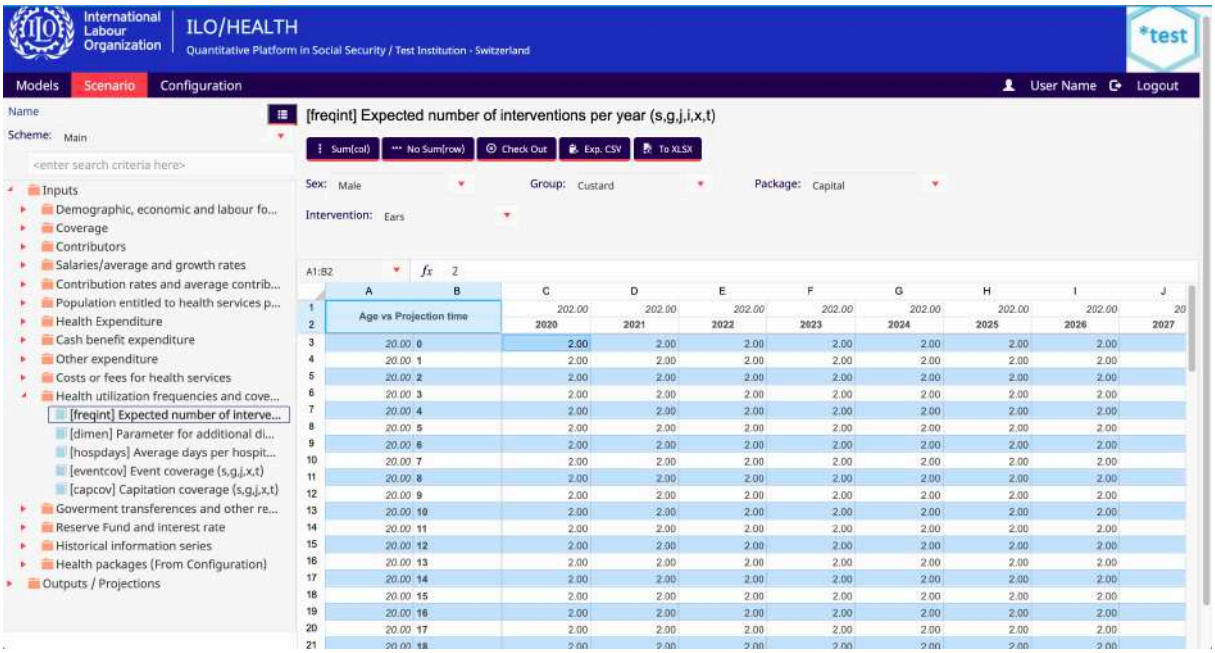
	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.00%	10100.0
2			2020	2021	2022	2023	2024	2025	2026	2027
3	1000.00%	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
4	1000.00%	1	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
5	1000.00%	2	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
6	1000.00%	3	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
7	1000.00%	4	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
8	1000.00%	5	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
9	1000.00%	6	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
10	1000.00%	7	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
11	1000.00%	8	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
12	1000.00%	9	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
13	1000.00%	10	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
14	1000.00%	11	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
15	1000.00%	12	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
16	1000.00%	13	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
17	1000.00%	14	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
18	1000.00%	15	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
19	1000.00%	16	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
20	1000.00%	17	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
21	1000.00%	18	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0
22	1000.00%	19	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.0

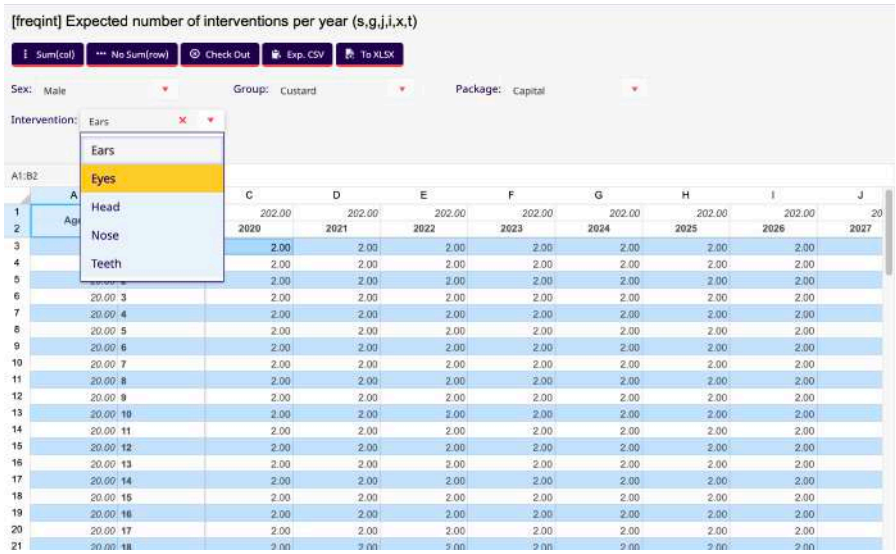


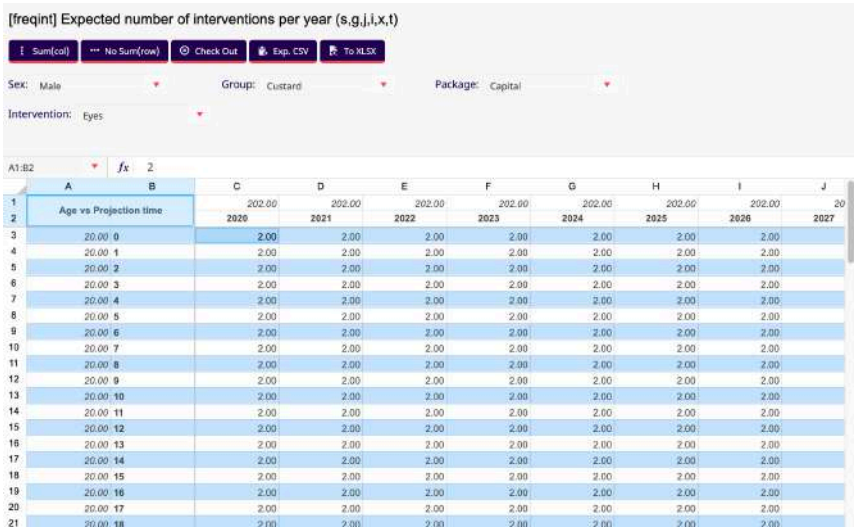
6.3.7. Modelling payment per intervention

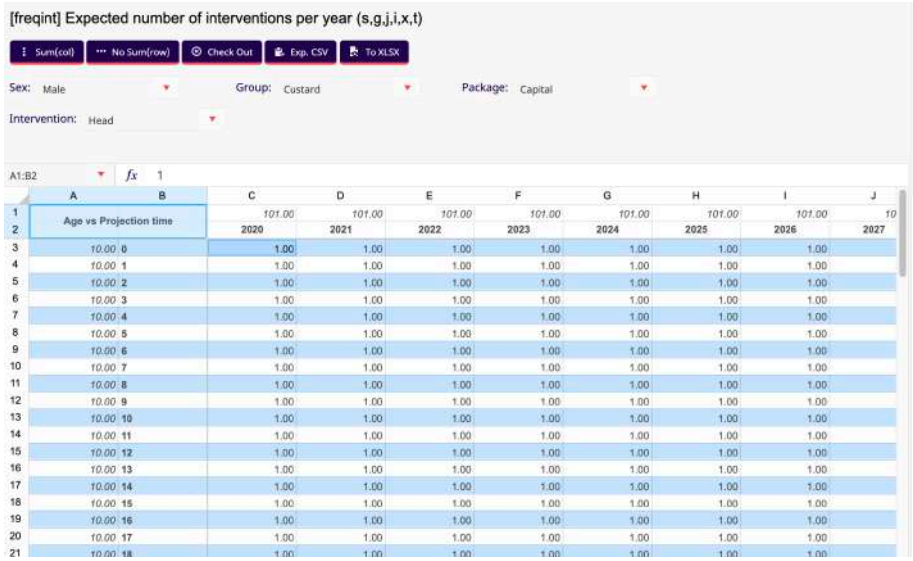
The matrices for expected number of interventions per year, [freqint], and unit cost per intervention, [costint], can be found in Inputs > Health utilization frequencies and coverage.

In the matrix [freqint], the packages paid by (MP5) Health intervention in the general case or by (MP6) Health intervention hospitalization are the only ones that offer the Check Out option. Users should determine packages are paid by these and fill in the matrix with the expected number of interventions a person of a given age and sex will receive in a year.




[freqint] Expected number of interventions per year (s,g,j,i,x,t)
Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
Intervention: Ears
Ears
Eyes
Head
Nose
Teeth
A1:B2
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027


[freqint] Expected number of interventions per year (s,g,j,i,x,t)
Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
Intervention: Eyes
A1:B2
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027


[freqint] Expected number of interventions per year (s,g,j,i,x,t)
Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
Intervention: Head
A1:B2
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027

[freqint] Expected number of interventions per year (s,g,j,i,x,t)

Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Capital

Intervention: Head

A1:B2 fx 1

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		101.00	101.00	101.00	101.00	101.00	101.00	101.00	10
2			2020	2021	2022	2023	2024	2025	2026	2027
3	10.00	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
4	10.00	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	10.00	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
6	10.00	3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
7	10.00	4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
8	10.00	5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
9	10.00	6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
10	10.00	7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
11	10.00	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
12	10.00	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	10.00	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
14	10.00	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
15	10.00	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
16	10.00	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
17	10.00	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
18	10.00	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
19	10.00	16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
20	10.00	17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
21	10.00	18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

[freqint] Expected number of interventions per year (s,g,j,i,x,t)

Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Capital

Intervention: Teeth

A1:B2 fx 32

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		3,232.00	3,232.00	3,232.00	3,232.00	3,232.00	3,232.00	3,232.00	3,23
2			2020	2021	2022	2023	2024	2025	2026	2027
3	320.00	0	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
4	320.00	1	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
5	320.00	2	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
6	320.00	3	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
7	320.00	4	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
8	320.00	5	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
9	320.00	6	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
10	320.00	7	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
11	320.00	8	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
12	320.00	9	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
13	320.00	10	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
14	320.00	11	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
15	320.00	12	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
16	320.00	13	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
17	320.00	14	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
18	320.00	15	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
19	320.00	16	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
20	320.00	17	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3
21	320.00	18	32.00	32.00	32.00	32.00	32.00	32.00	32.00	3

[freqint] Expected number of interventions per year (s,g,j,i,x,t)

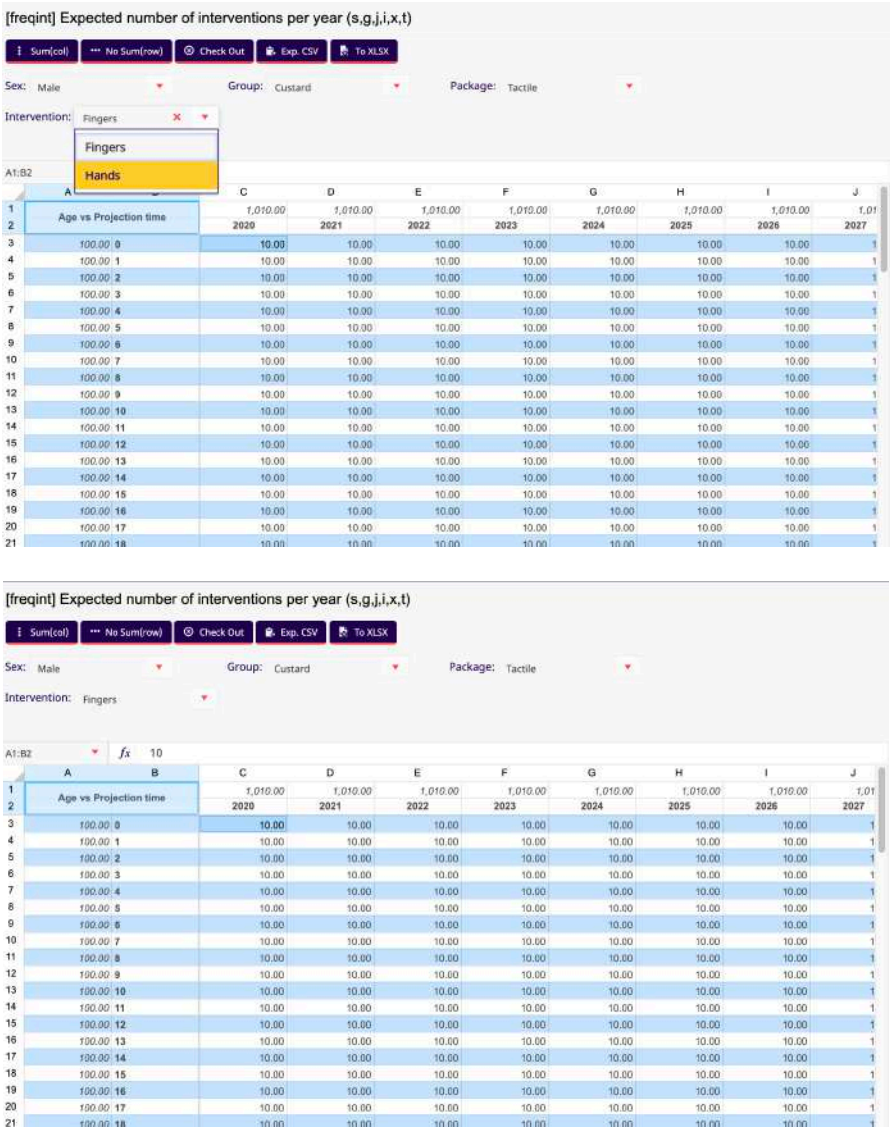
Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Sex: Male Group: Custard Package: Tactile

Intervention: Fingers

A1:B2 fx 10

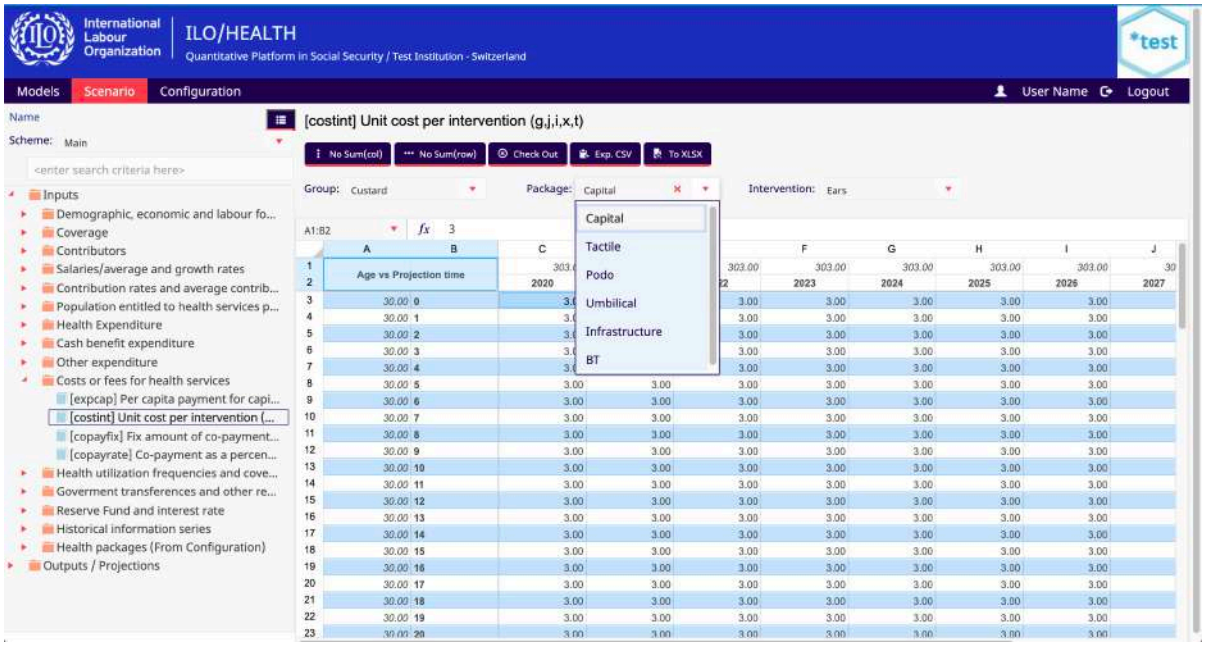
	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,01
2			2020	2021	2022	2023	2024	2025	2026	2027
3	100.00	0	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
4	100.00	1	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
5	100.00	2	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
6	100.00	3	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
7	100.00	4	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
8	100.00	5	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
9	100.00	6	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
10	100.00	7	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
11	100.00	8	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
12	100.00	9	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
13	100.00	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
14	100.00	11	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
15	100.00	12	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
16	100.00	13	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
17	100.00	14	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
18	100.00	15	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
19	100.00	16	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
20	100.00	17	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
21	100.00	18	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1

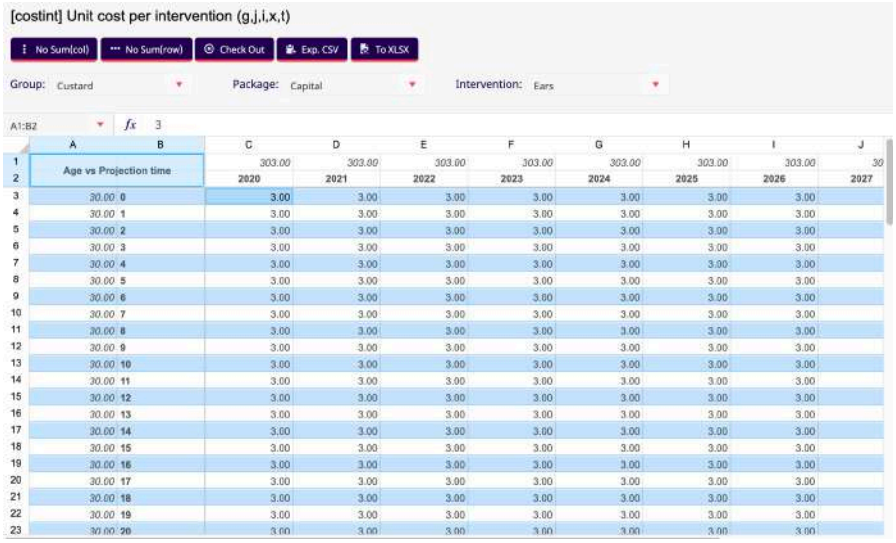


➔ In this exercise, each person, regardless of age and sex, will receive the following interventions: one Nose, one Head, two Eyes, two Ears, two Hands, 10 Fingers and 32 Teeth. (Remember the tricks for copying one completed matrix and pasting it into another or using export and import csv to facilitate the process.) Fill in the information for both sexes for the packages Capital and Tactile.

Similarly, in Inputs > Costs or fees for health services, the matrix [costint] provides the cost of each intervention (medical contact) or treatment day for an intervention that is paid by (MP6) Health intervention hospitalization. Costs change by age but remain the same for both sexes.

➔ For the example, Nose costs 1, Head 10, Eyes 2, Ears 3, Hands 1 per day, Fingers 0.5 per day, and Teeth 4. Input these values in the respective matrices and check in.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
<enter search criteria here>
Inputs
Demographic, economic and labour fo...
Coverage
Contributors
Salaries/average and growth rates
Contribution rates and average contrib...
Population entitled to health services p...
Health Expenditure
Cash benefit expenditure
Other expenditure
Costs or fees for health services
[expcap] Per capita payment for capi...
[costint] Unit cost per intervention (...
[copayfix] Fix amount of co-payment...
[copayrate] Co-payment as a percen...
Health utilization frequencies and cove...
Goverment transferences and other re...
Reserve Fund and interest rate
Historical information series
Health packages (From Configuration)
Outputs / Projections
[costint] Unit cost per intervention (g,j,i,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Package: Capital
Intervention: Ears
Capital
Tactile
Podo
Umbilical
Infrastructure
BT
A1:B2
Age vs Projection time
2020
2023
2024
2025
2026
2027


[costint] Unit cost per intervention (g,j,i,x,t)
No Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Group: Custard
Package: Capital
Intervention: Ears
A1:B2
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027

[costint] Unit cost per intervention (g,j,i,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Group: Custard | Package: Capital | Intervention: Eyes

A1:B2 | fx 2

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		202.00	202.00	202.00	202.00	202.00	202.00	202.00	20
2			2020	2021	2022	2023	2024	2025	2026	2027
3	20.00	0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
4	20.00	1	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
5	20.00	2	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
6	20.00	3	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
7	20.00	4	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
8	20.00	5	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
9	20.00	6	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
10	20.00	7	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
11	20.00	8	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
12	20.00	9	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
13	20.00	10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
14	20.00	11	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
15	20.00	12	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
16	20.00	13	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
17	20.00	14	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
18	20.00	15	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
19	20.00	16	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
20	20.00	17	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
21	20.00	18	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
22	20.00	19	2.00	2.00	2.00	2.00	2.00	2.00	2.00	
23	20.00	20	2.00	2.00	2.00	2.00	2.00	2.00	2.00	

[costint] Unit cost per intervention (g,j,i,x,t)

No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Group: Custard | Package: Capital | Intervention: Head

A1:B2 | fx 10

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,010.00	1,01
2			2020	2021	2022	2023	2024	2025	2026	2027
3	100.00	0	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
4	100.00	1	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
5	100.00	2	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
6	100.00	3	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
7	100.00	4	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
8	100.00	5	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
9	100.00	6	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
10	100.00	7	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
11	100.00	8	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
12	100.00	9	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
13	100.00	10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
14	100.00	11	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
15	100.00	12	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
16	100.00	13	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
17	100.00	14	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
18	100.00	15	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
19	100.00	16	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
20	100.00	17	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
21	100.00	18	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
22	100.00	19	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1
23	100.00	20	10.00	10.00	10.00	10.00	10.00	10.00	10.00	1

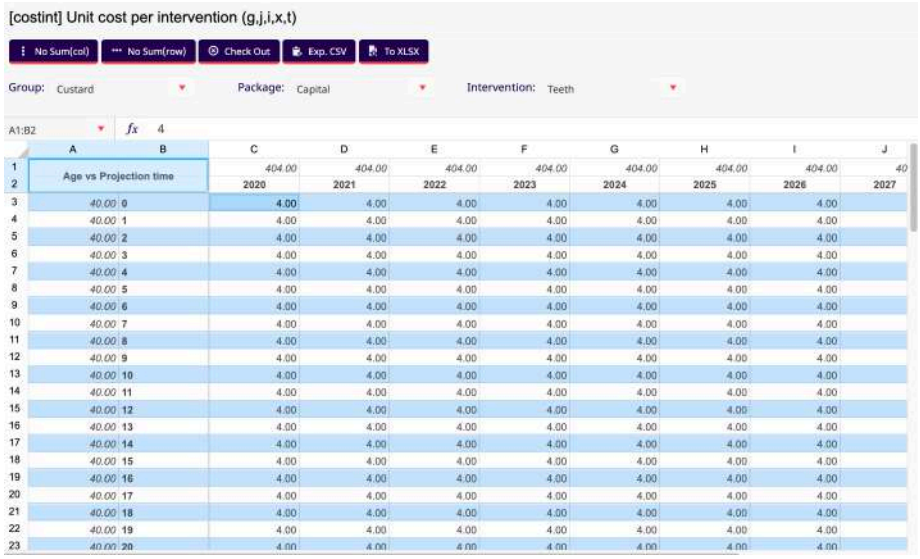
[costint] Unit cost per intervention (g,j,i,x,t)

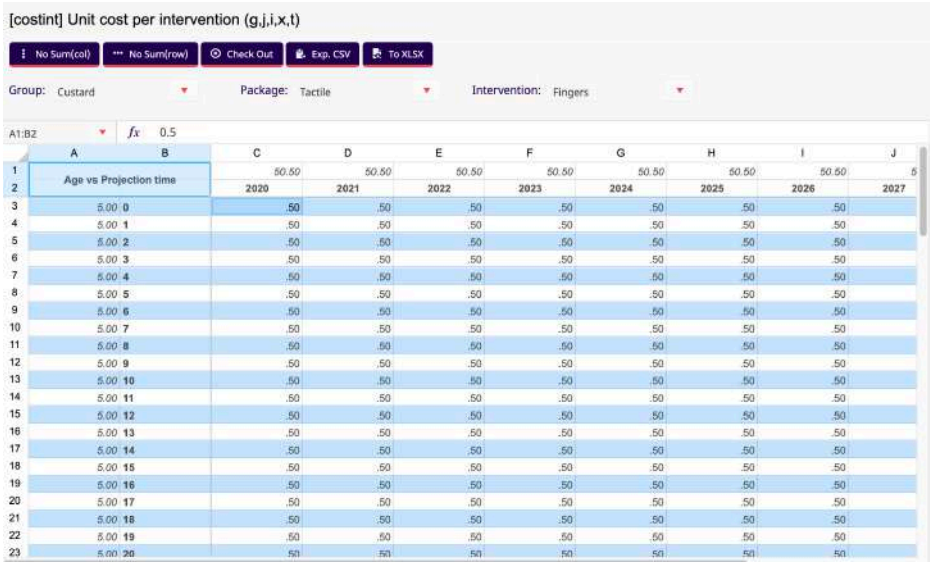
No Sum(col) | No Sum(row) | Check Out | Exp. CSV | To XLSX

Group: Custard | Package: Capital | Intervention: Nose

A1:B2 | fx 1

	A	B	C	D	E	F	G	H	I	J
1	Age vs Projection time		101.00	101.00	101.00	101.00	101.00	101.00	101.00	10
2			2020	2021	2022	2023	2024	2025	2026	2027
3	10.00	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
4	10.00	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	10.00	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
6	10.00	3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
7	10.00	4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
8	10.00	5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
9	10.00	6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
10	10.00	7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
11	10.00	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
12	10.00	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	10.00	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
14	10.00	11	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
15	10.00	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
16	10.00	13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
17	10.00	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
18	10.00	15	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
19	10.00	16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
20	10.00	17	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
21	10.00	18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
22	10.00	19	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
23	10.00	20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

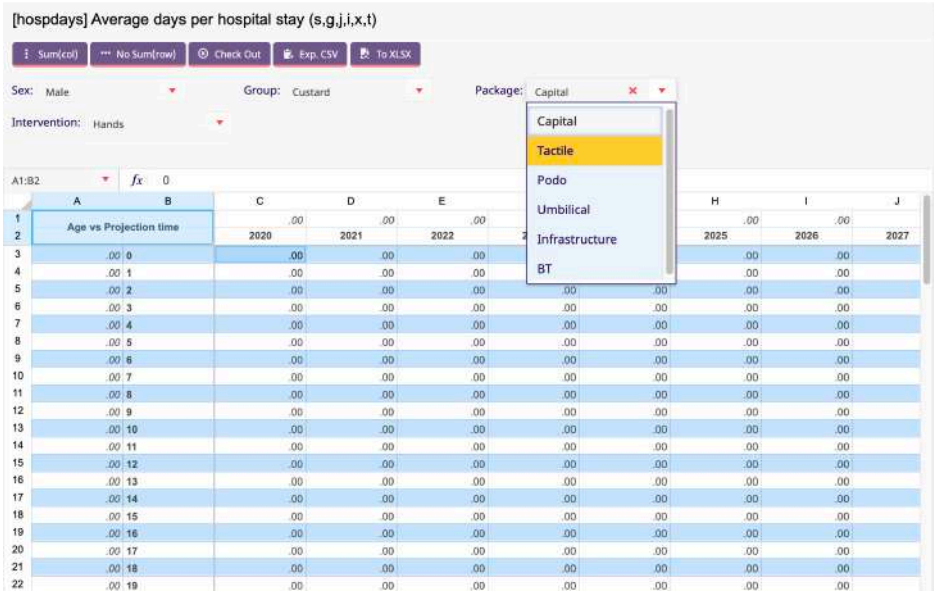


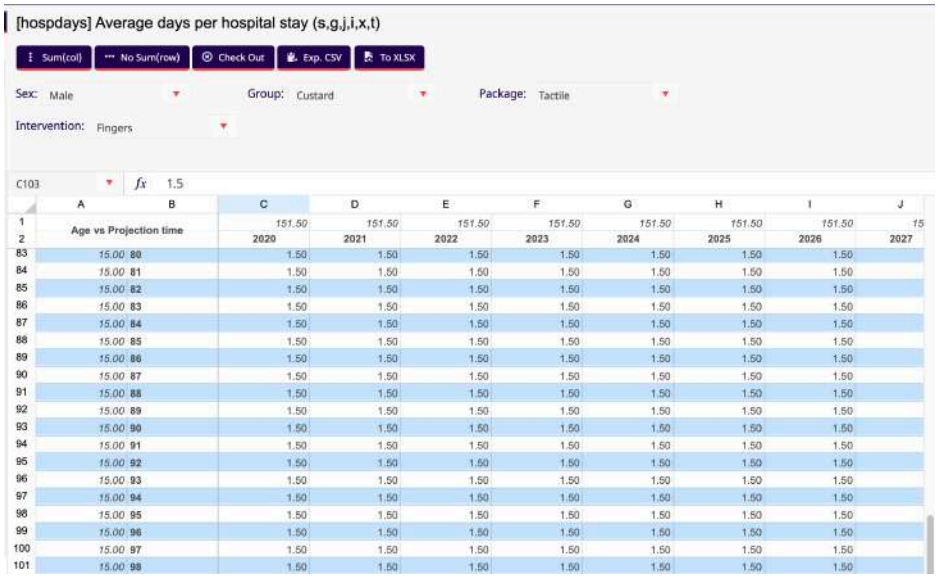


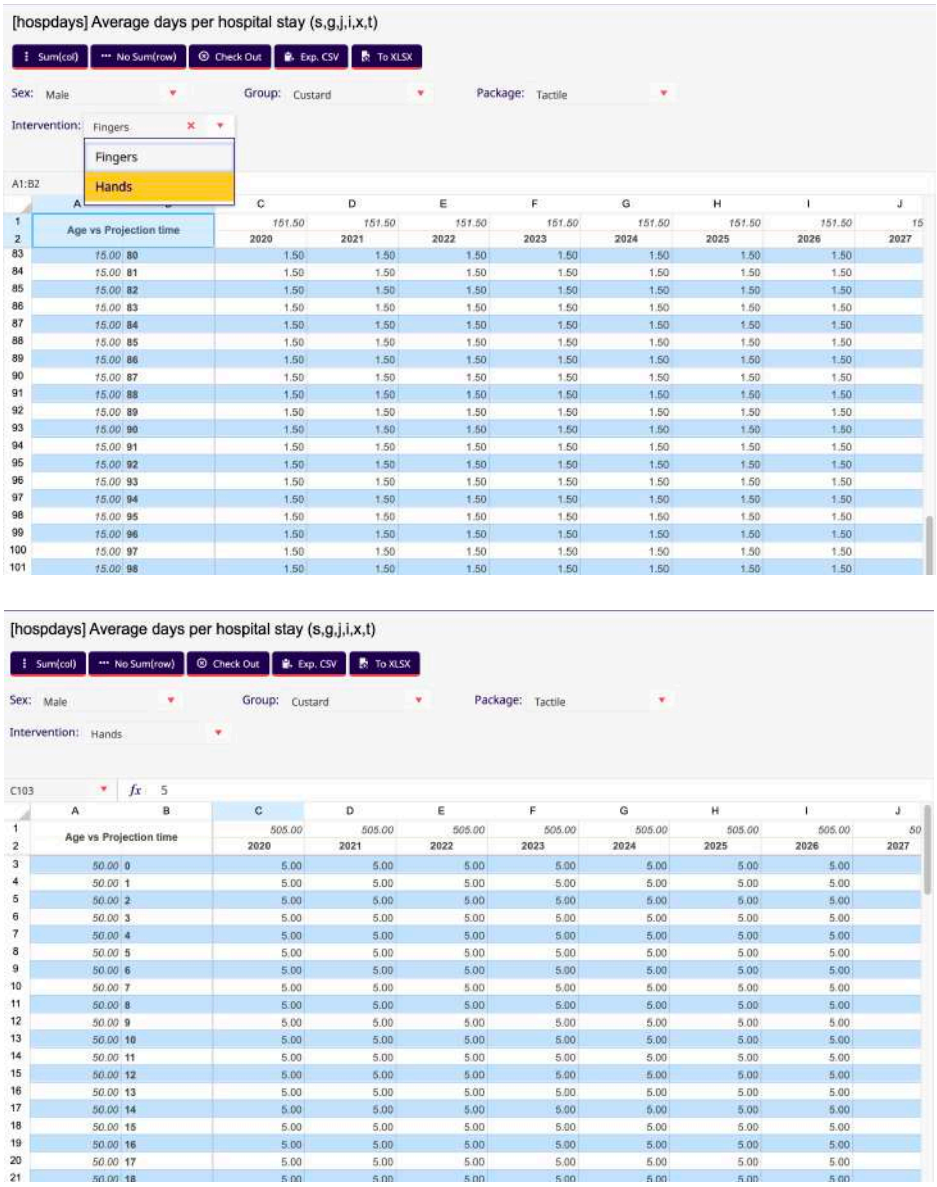
6.3.7.1. *Modelling hospitalization payment*

For packages paid by (MP6) By health intervention hospitalization, the matrix [hospdays] contains the number of days of expected treatment for a contact of a given intervention. This matrix is found in: Inputs > Health utilization frequencies and coverage.

➔ In the example, for the Tactile package, Hand requires five days on average for both sexes, regardless of age. Finger requires 1.5 days. Users should enter these values into the matrix for both sexes.


[hospdays] Average days per hospital stay (s,g,j,i,x,t)
Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
Intervention: Hands
Capital
Tactile
Podo
Umbilical
Infrastructure
BT
A1:B2
Age vs Projection time
2020
2021
2022
2025
2026
2027


[hospdays] Average days per hospital stay (s,g,j,i,x,t)
Sum(col)
No Sum(row)
Check Out
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Tactile
Intervention: Fingers
C103
1.5
Age vs Projection time
2020
2021
2022
2023
2024
2025
2026
2027



6.3.8. Modelling co-payments

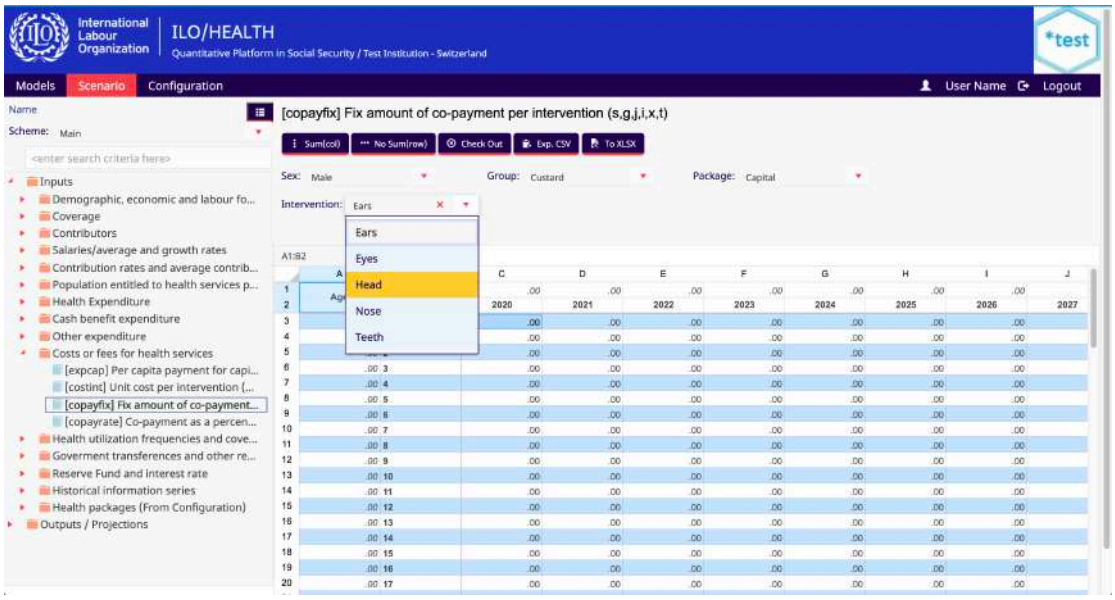
Co-payment refers to sums requested from insured members of the scheme each time they receive a given healthcare intervention or when insured member are reimbursed. It is a mechanism of financing and sometimes a policy to regulate the demand for services. The use and effects of co-payments are beyond the scope of this manual.

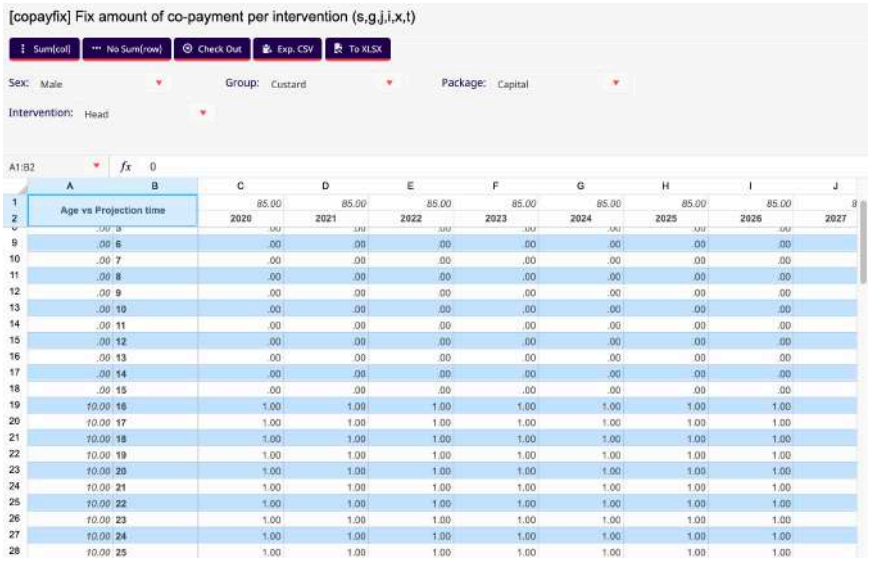
In some cases, co-payments are not part of the insurer's revenue. In these cases, users of the model should simply ignore co-payments as part of the revenues, or simply disregard the proportion of co-payments as part of the costs and expenses.

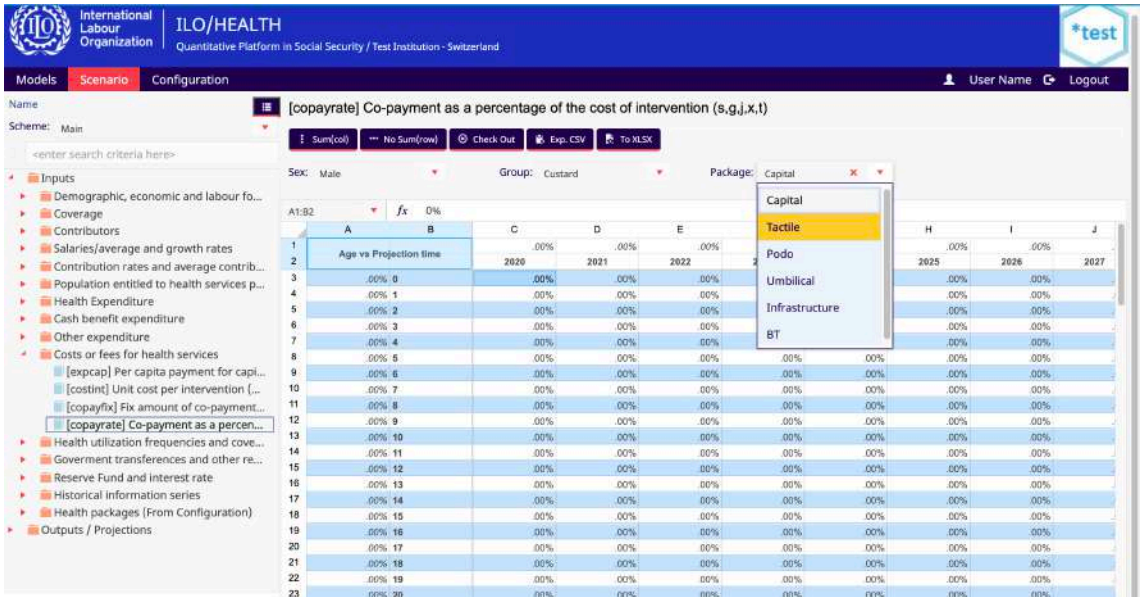
ILO/HEALTH offers two complementary co-payment methods: a fixed amount for the same lump sum each time a patient receives a given intervention, [copayfix], or a co-payment rate where users must cover a given percentage of the total costs of interventions received as part of the package, [copayrate]. These are found in: Inputs > Costs of fees for health services.

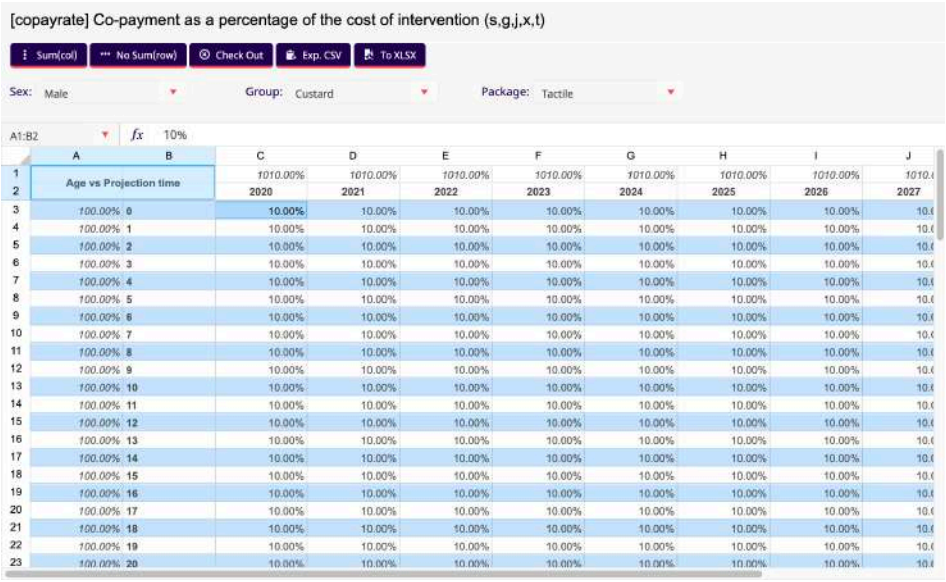
The exercise uses a fixed co-payment of 1 for each Head intervention for everyone over age 15, and a 10 per cent co-payment for every intervention in the Tactile package for everyone.

➔ Users should select the matrix [copayfix], locate the Capital package, choose the Head intervention, check out, fill in all the rows after age 15 with 1 for male and female, and check in. Then select [copayrate], the Tactile package, enter 10 per cent once checked out, then check in and repeat for female.





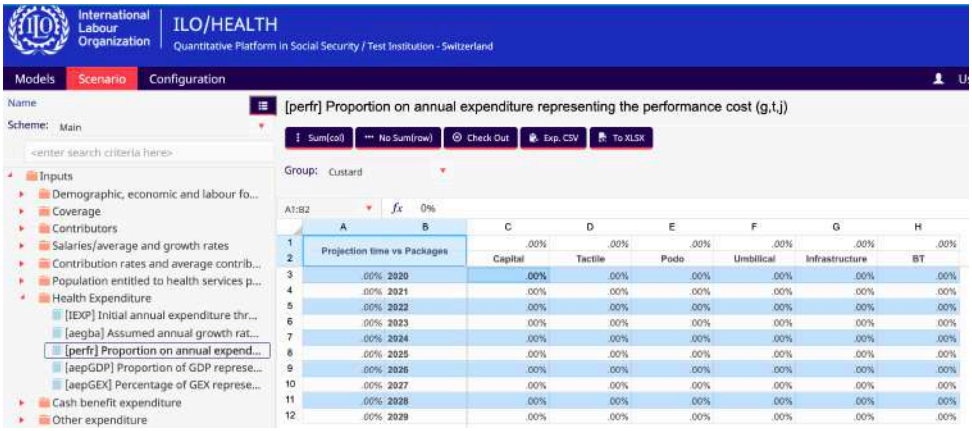




6.3.9. Modelling performance adjustment

The proportion of annual expenditures representing incentives or disincentives to healthcare providers linked to performance by group and package over the projection period is included in the matrix [perfr]. The positive or negative adjustment is input per package in the matrix. It is found in: Inputs > Health Expenditure.

➔ This exercise keeps [perfr] as zero, meaning that there are no additional performance costs or savings because of performance incentives/disincentives. Check out and check in in the matrix to advance the Completion brief.



6.3.10. Modelling other items

Government Transfers, [GT], interest revenues, [i_rate], other revenues, [ORev], other expenditures, [OExp], and the initial fund reserve, [IRES], can also be input as required by the model.

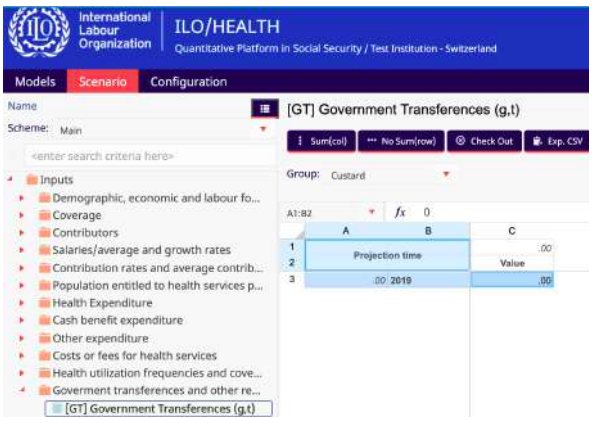
Government Transfers, [GT], and other revenues, [ORev], are found in Inputs > Government transfers and other revenue.

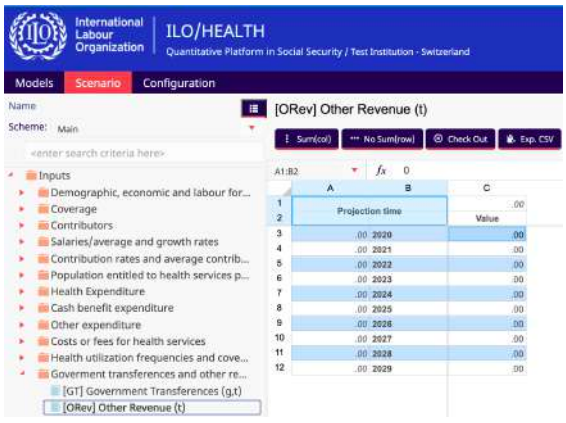
Interest rate of the reserve fund, [i_rate], and Initial pension fund reserve, [IRES], are found in Inputs > Reserve fund and interest rate.

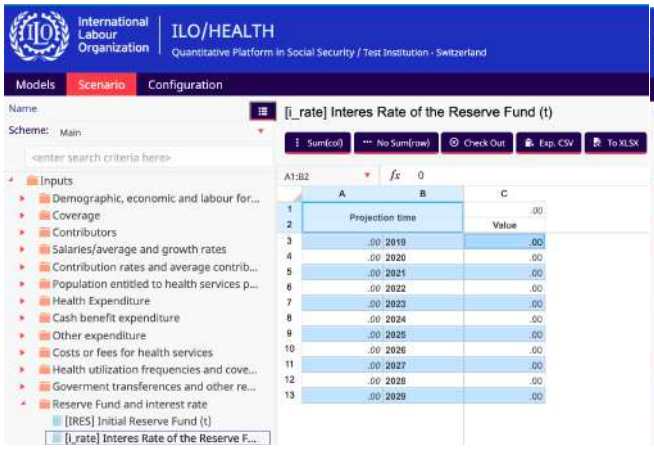
Other expenditures, [OExp], are found in Inputs > Other expenditure.

For the exercise, given that it represents a new scheme without past experience, the initial reserve [IRES] is zero. For the sake of simplicity, government transfers, interest and other revenues and expenditures are also assumed to be zero.

➔ Check out and check in for [GT], [ORev], [i_rate], and [OExp], then check the Completion brief.

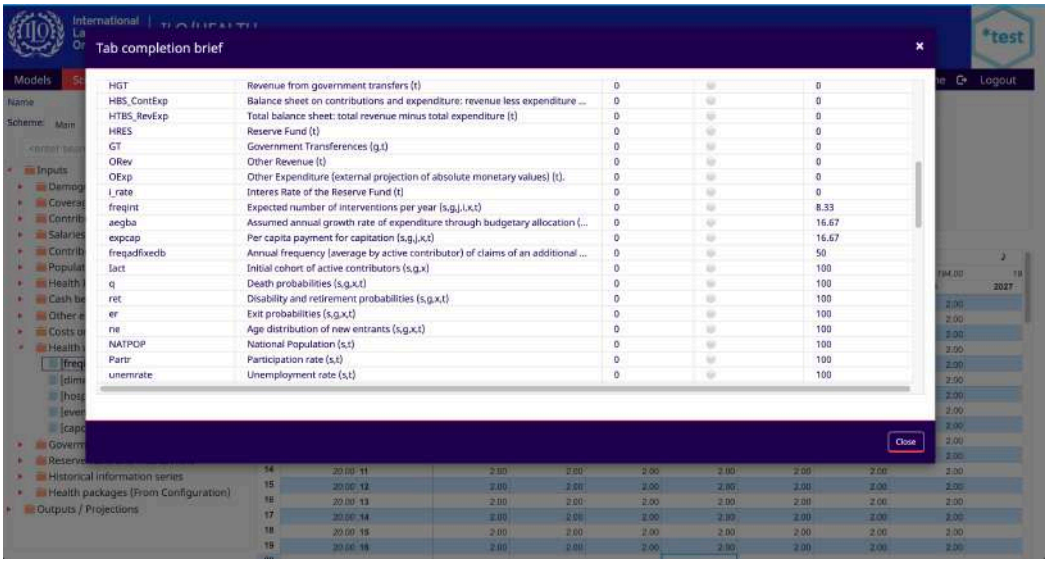


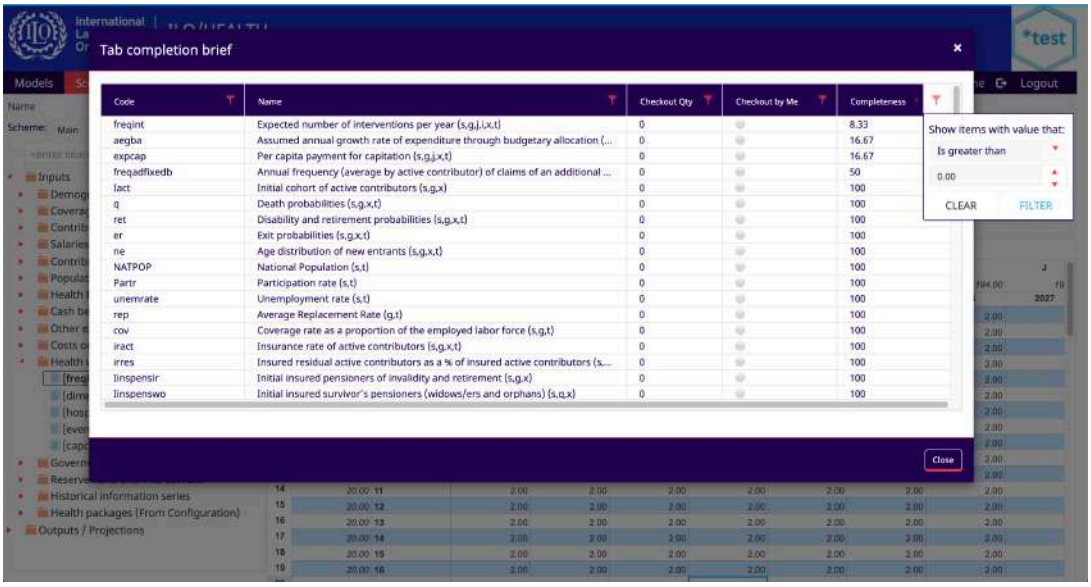


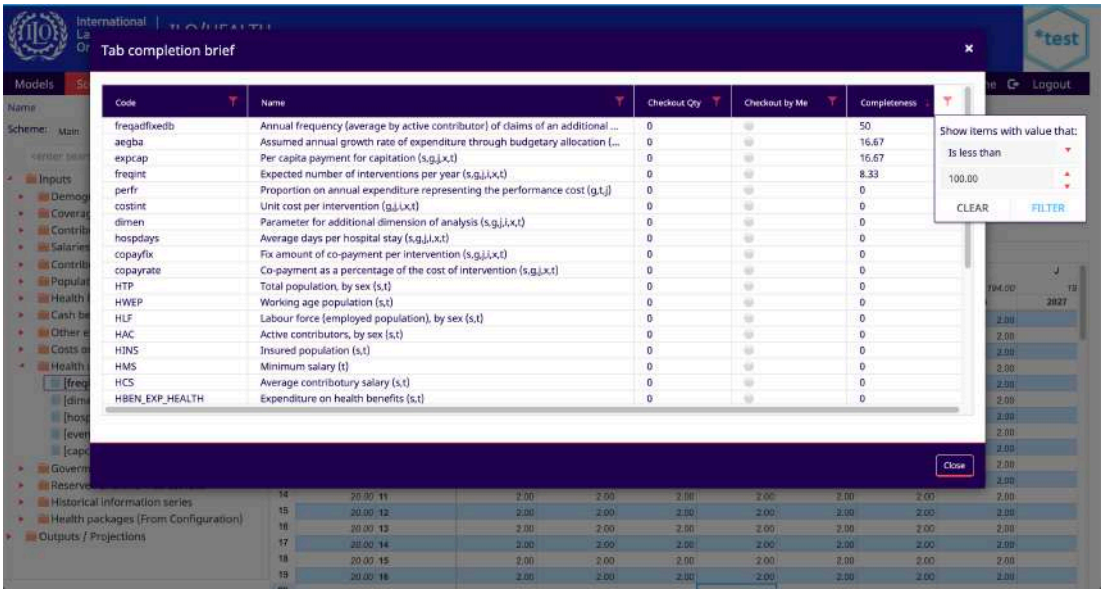

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[i_rate] Interes Rate of the Reserve Fund (t)
Projection time
Value


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[IRES] Initial Reserve Fund (t)
Projection time
Value


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[OExp] Other Expenditure (external projection of absolute monetary values) (t).
Projection time
Value


Tab completion brief
HGT
Revenue from government transfers (t)
HBS_ContExp
Balance sheet on contributions and expenditure: revenue less expenditure ...
HTBS_RevExp
Total balance sheet: total revenue minus total expenditure (t)
HRES
Reserve Fund (t)
GT
Government Transferences (g,t)
ORev
Other Revenue (t)
OExp
Other Expenditure (external projection of absolute monetary values) (t).
i_rate
Interes Rate of the Reserve Fund (t)
freqint
Expected number of interventions per year (s,g,j,i,k,t)
aegba
Assumed annual growth rate of expenditure through budgetary allocation (...
expcap
Per capita payment for capitation (s,g,j,k,t)
freqadfixedb
Annual frequency (average by active contributor) of claims of an additional ...
lact
Initial cohort of active contributors (s,g,x)
q
Death probabilities (s,g,x,t)
ret
Disability and retirement probabilities (s,g,x,t)
er
Exit probabilities (s,g,x,t)
ne
Age distribution of new entrants (s,g,x,t)
NATPOP
National Population (s,t)
Partr
Participation rate (s,t)
unemrate
Unemployment rate (s,t)
Close

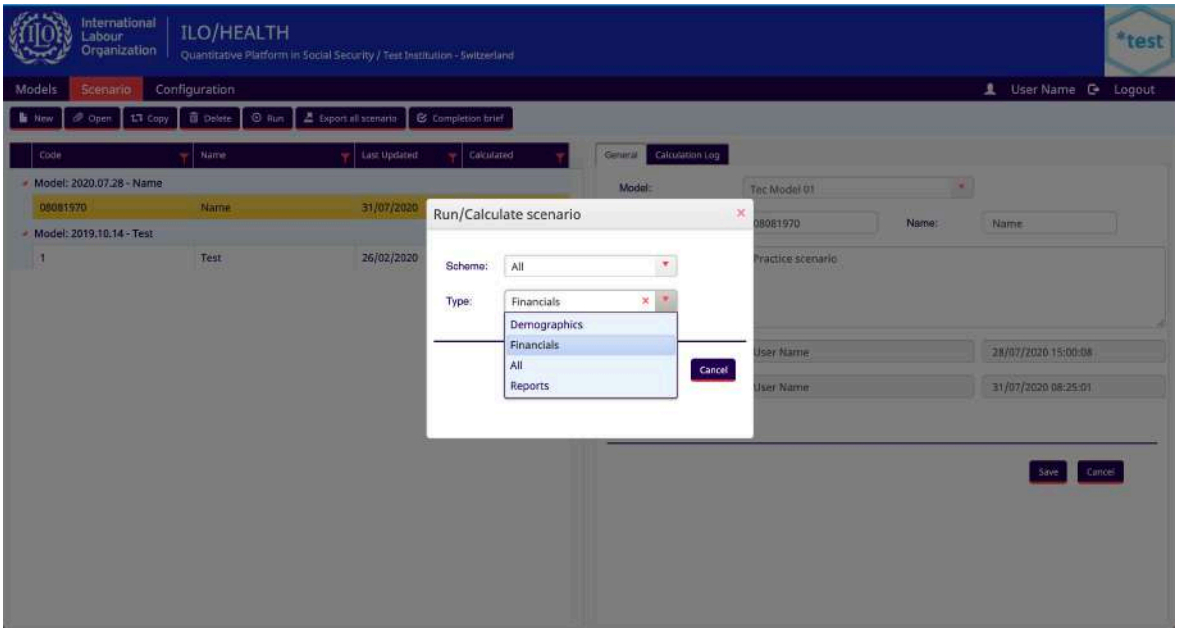


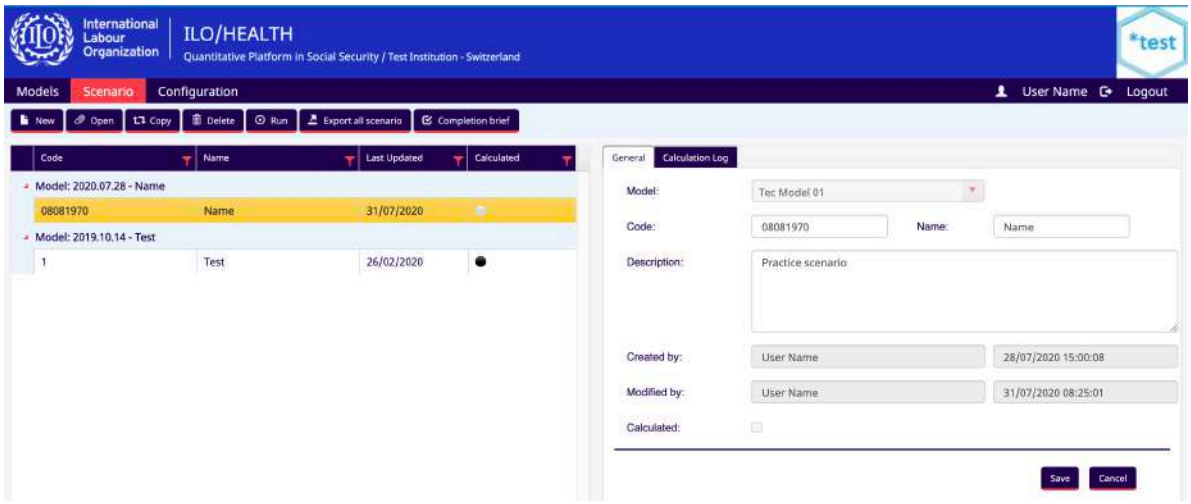


6.4. Running the financial projection

This is a good time to run the financial projection and, with it, the entire projection. To run the scenario, users should go to the Scenario menu, select the desired scenario and then Run. In the options, choose All schemes, and in Type of run, users can opt to run only Financial (given that the Demographic was already completed in a previous step) or to run All. The running will take place remotely and users will be informed by email whether it was successful. If successful, they will see all demographic and financial output matrices completed and a complete set of reports.

Once the Scenario is run, users can explore the newly completed output, and matrices are available for further exploration.





Scenario Calculation | ILO/HEALTH [Costa Rica-TEC]

ilopension@gmail.com
to me

Hi, User Name

Scenario calculation process completed!

```
Code:        08081970
Name:        Name [Costa Rica/TEC]
Calculation: Financials
Status:      Success
```

Message: -N/A-.

6.5. Exploring the basic output matrices

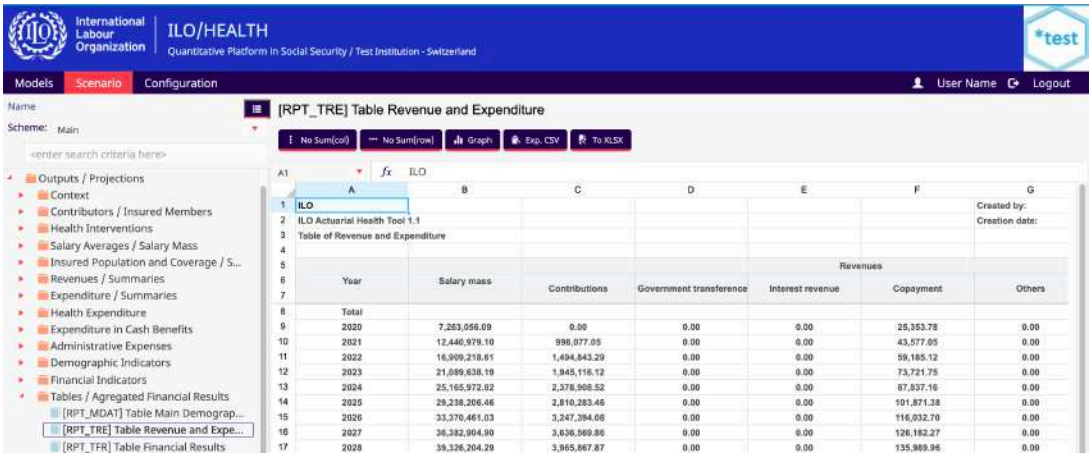
This section describes the information available in the main output matrices and potential uses for that information. The section moves from general to more specific matrices, and from those used in most actuarial exercises to those that are usually accessed only for detailed calculations. It is advisable to begin by examining the simpler matrices (those that are a single column with a time dimension) that can be plotted as a line or bar chart. Users can then move to matrices with age (in rows) and time (in columns) that can be plotted as areas or line charts to perform comparisons by years.

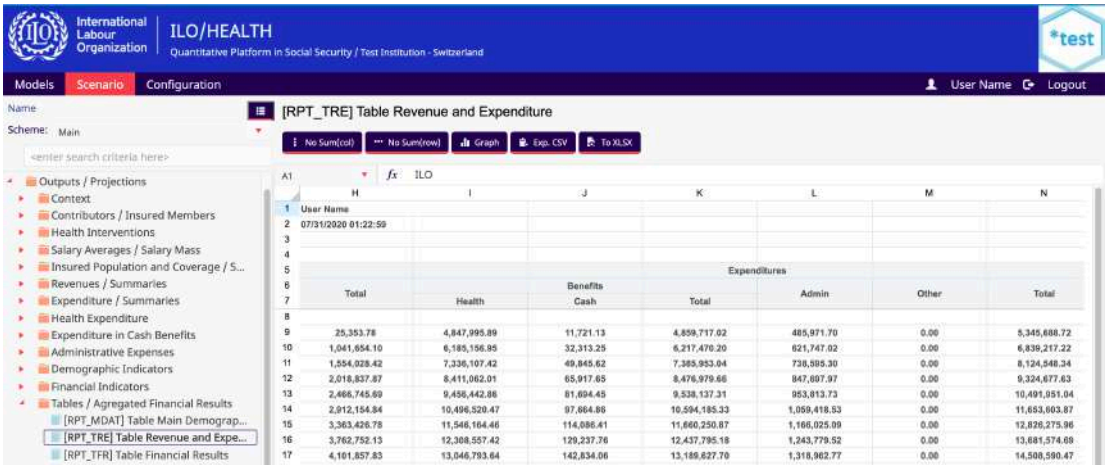
6.5.1. Financial report matrices

Users are advised to first look at the Revenue and Expenditure Table [RPT_TRE]. This table identifies the main financial projections of the scheme crucial to scheme sustainability. It is found in: Outputs/Projections > Tables/Aggregated Financial Results > RPT_TRE.

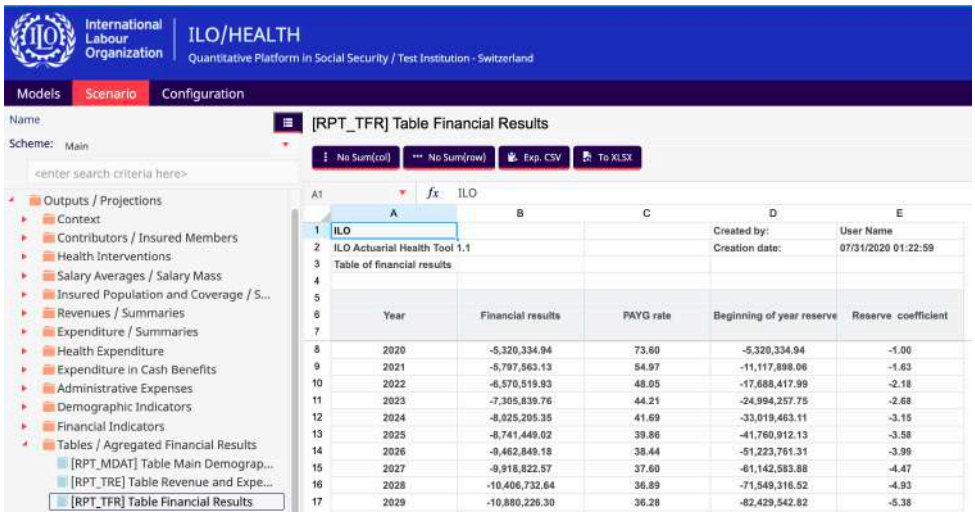
The table contains three sections: Income, Expenditure and Results.

In the Income section, the first column is Salary mass, showing the level of potential insurable earnings. The second column shows Contributions (calculated over the Salary mass), followed by Government transfers, Interest income, Co-payment and Other income. The final column of the section is the Total income (the sum of all income items). **The Expenditure section** shows a subsection, Benefits, that demonstrates the Value of health and cash benefits and their subtotal. Besides benefits, the section has Administration expenditure, Other expenditure, and finally a Total of all expenditure (sum of the total of Benefit expenditure, Administrative and Other expenditures).



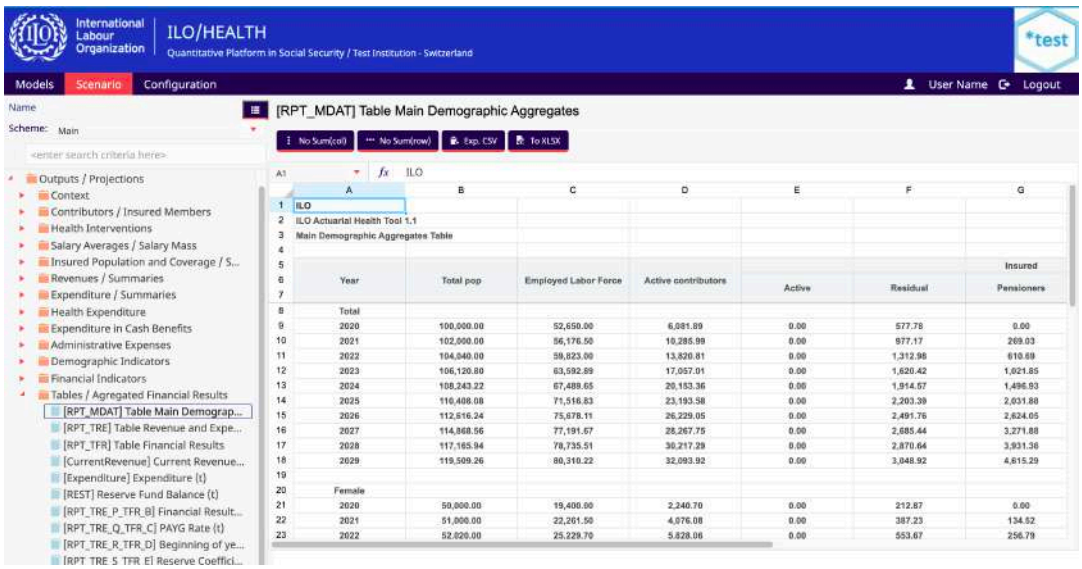


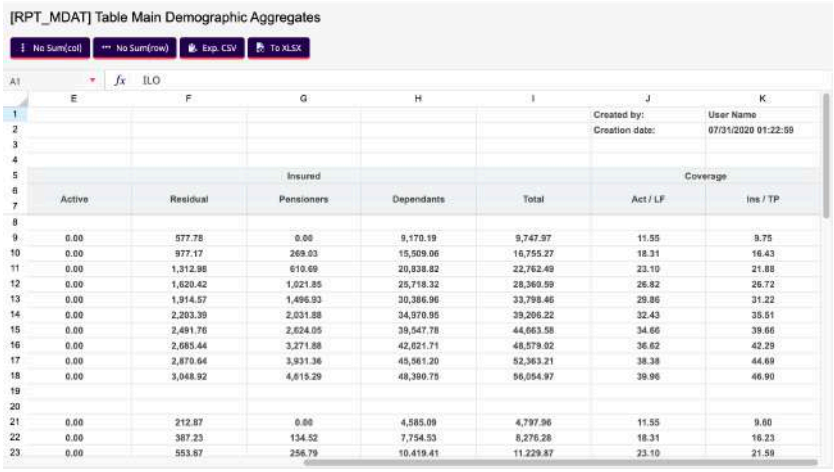
Net results are found in the Table Financial Results [RPT_TFR] in the same section of the navigation tree. The first column, Result, corresponds to the difference between Income and Expenditure. Next is the PAYG rate that shows the ratio between Expenditure and Salary mass, then Reserve, which shows the expected value of the fund's reserve. The last column, Reserve coefficient, shows the times the reserve covers annual expenditures.



6.5.2. Demographic report matrices

The Main Demographic Aggregates Table [RPT_MDAT] lists the sizes of key demographic aggregates. It is found in: Outputs/Projections > Tables/Aggregated Financial Results > RPT_MDAT. The columns have two main sections: First, the contributor-related section with information on the total population, labour force and the total active contributors. Second, the insured-related section with information on the number of insured from groups such as: Current active, Residual, Pensioners and Family dependants, followed by the Total insured. Finally, the report has two columns of indicators: Coverage of contributors with respect to the labour force and Coverage of insured over the total population.

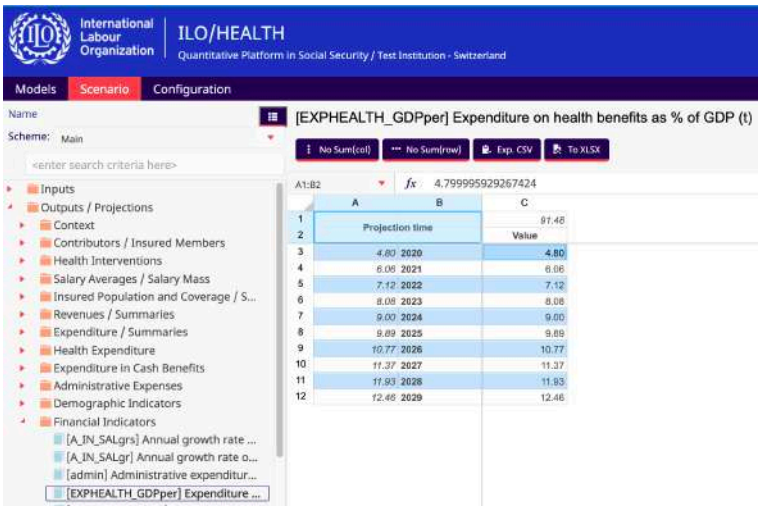


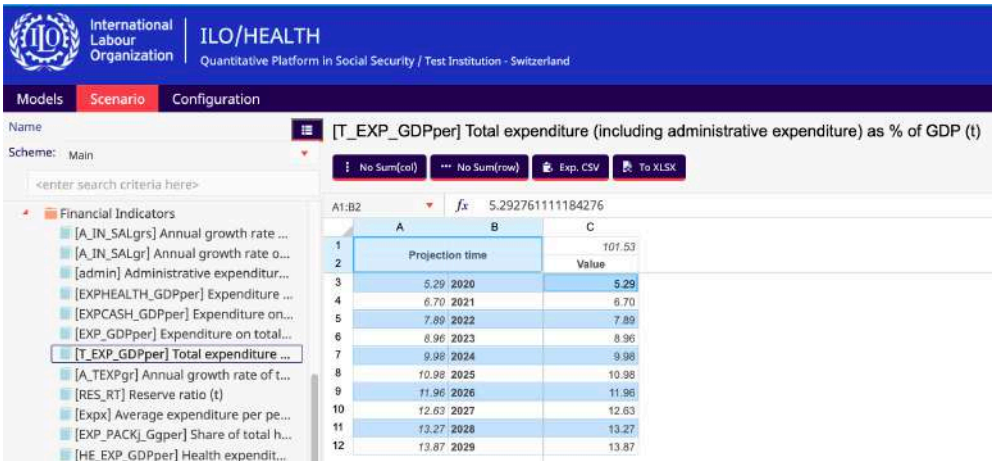


6.5.3. Financial indicators

Indicators correspond to a data series employed to highlight certain aspects of a projection. They are the results of comparisons between projection results and are therefore replicable. ILO/HEALTH automatically calculates these as they are frequently requested in actuarial valuations. Expenditure ratios

These indicators are comparisons of certain expenditure items or total expenditures with other aggregates. They assess the magnitude of these expenditures with respect to the economy in the case of [EXPHEALTH_GDPper] Expenditure on health benefits as a percentage of GDP, and [T_EXP_GDPper] Total expenditure as a percentage of GDP. They may also assess the relative efficiency of expenditures as in the case of [admin] Administrative expenditures as a percentage of the total expenditures.



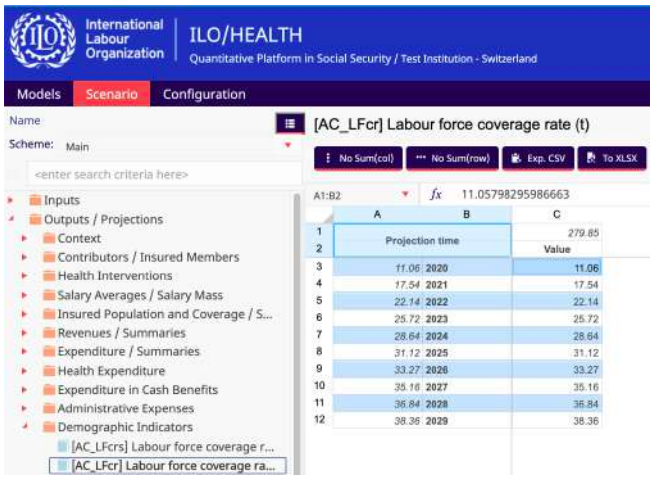


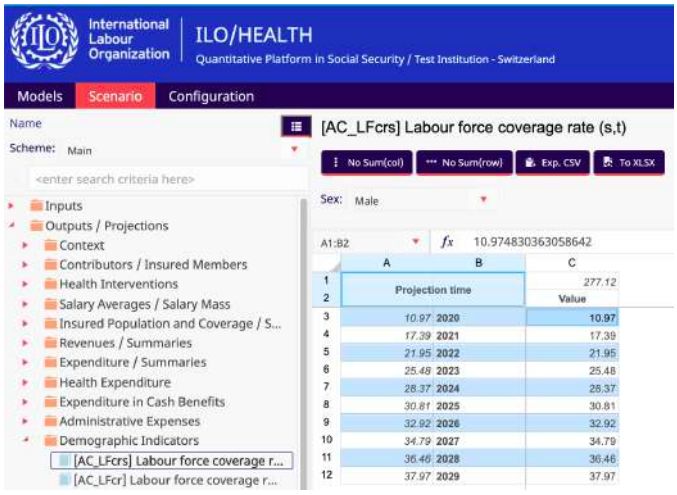
6.5.4. Demographic indicators

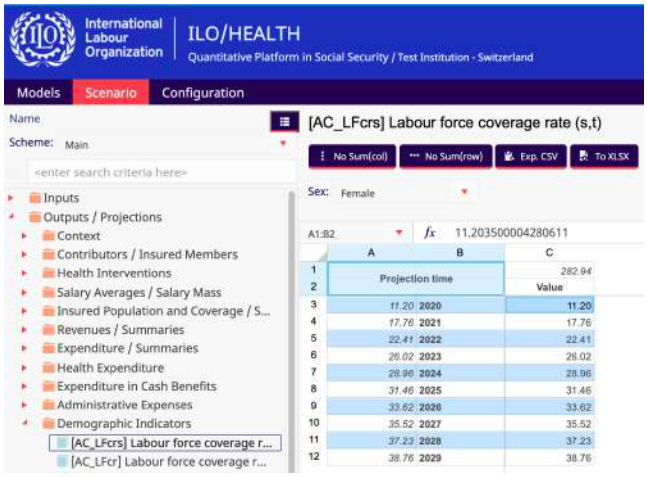
In addition to financial indicators, ILO/HEALTH provides a set of demographic indicators. These are found in: Outputs/Projections > Indicators > Demographic Indicators and are of two types:

6.5.4.1. *Coverage rates*

Ratios between demographic aggregates help users analyse how the schemes affect their target population. There are two kinds of coverage: Active coverage, which compares the active contributors over time with the labour force [AC_LFcr] for the total or [AC_LFcrs] by sex; and beneficiary coverage, which compares the number of insured to the national population [IP_NPcr] and [IP_NPcrs]. The higher the coverage, the more progress in making the scheme universal. They are found in: Outputs > Demographic Indicators.



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Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators
[AC_LFcrs] Labour force coverage r...
[AC_LFcr] Labour force coverage r...
[AC_LFcrs] Labour force coverage rate (s,t)
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To XLSX
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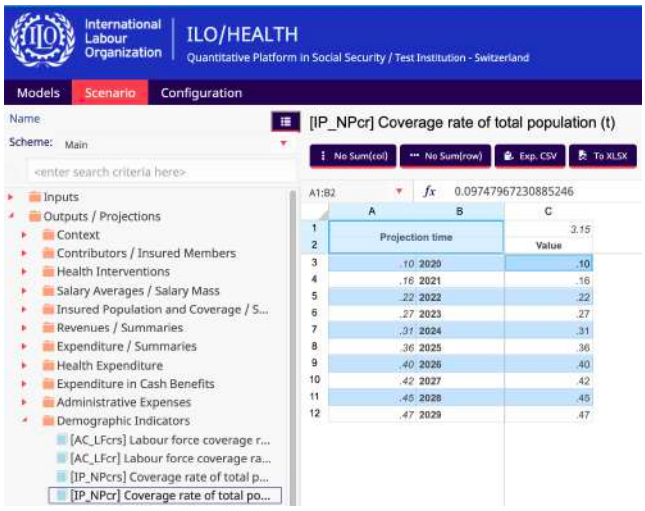
Projection time
Value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Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators
[AC_LFcrs] Labour force coverage r...
[AC_LFcr] Labour force coverage ra...
[IP_NPcrs] Coverage rate of total p...
[IP_NPcr] Coverage rate of total po...
[IP_NPcr] Coverage rate of total population (t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
A1:B2
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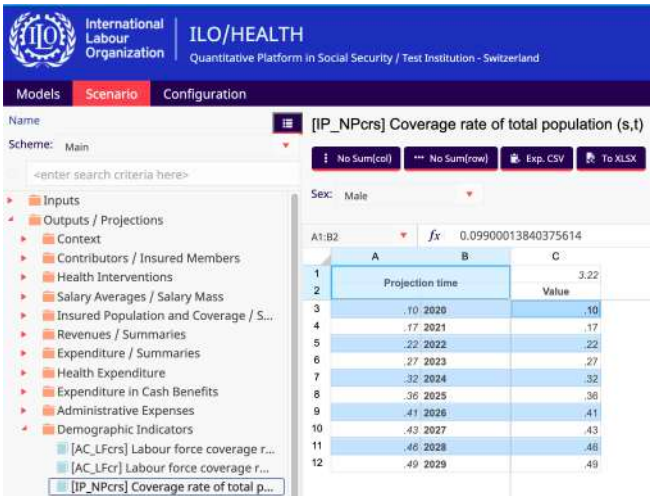
Projection time
Value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Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators
[AC_LFcrs] Labour force coverage r...
[AC_LFcr] Labour force coverage r...
[IP_NPcrs] Coverage rate of total p...
[IP_NPcrs] Coverage rate of total population (s,t)
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No Sum(row)
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To XLSX
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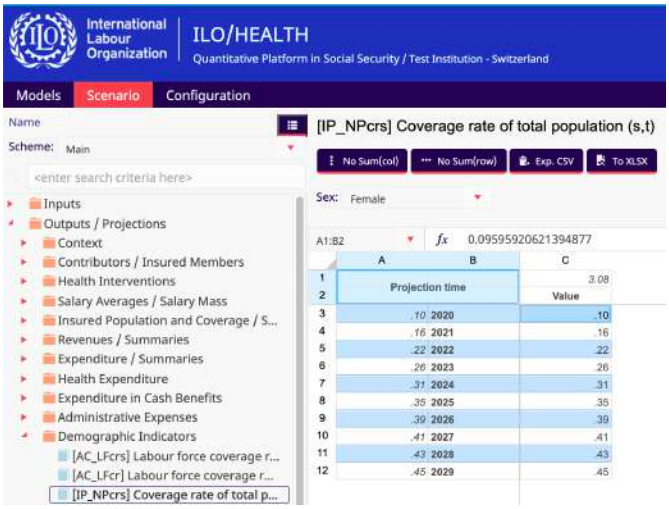
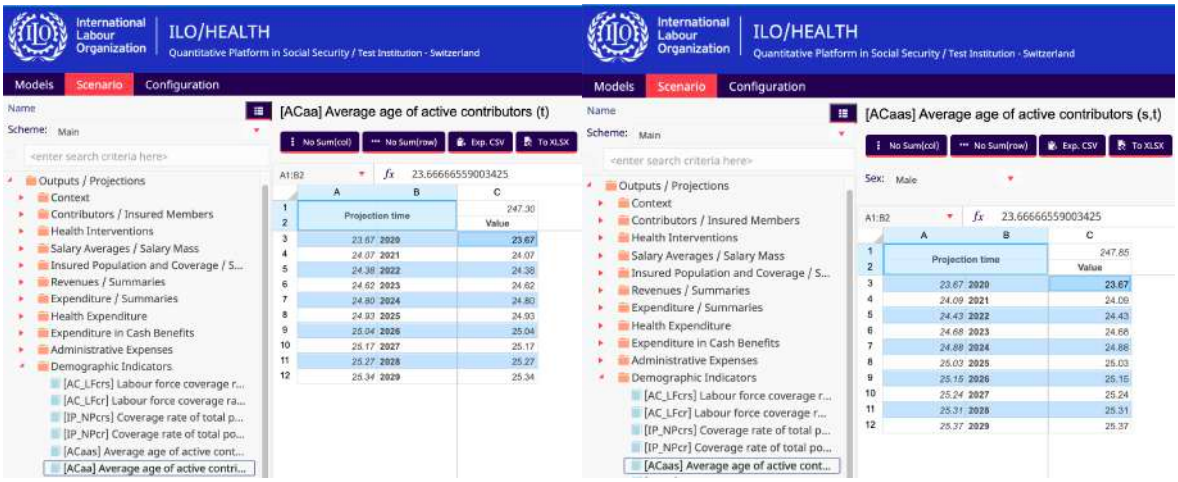
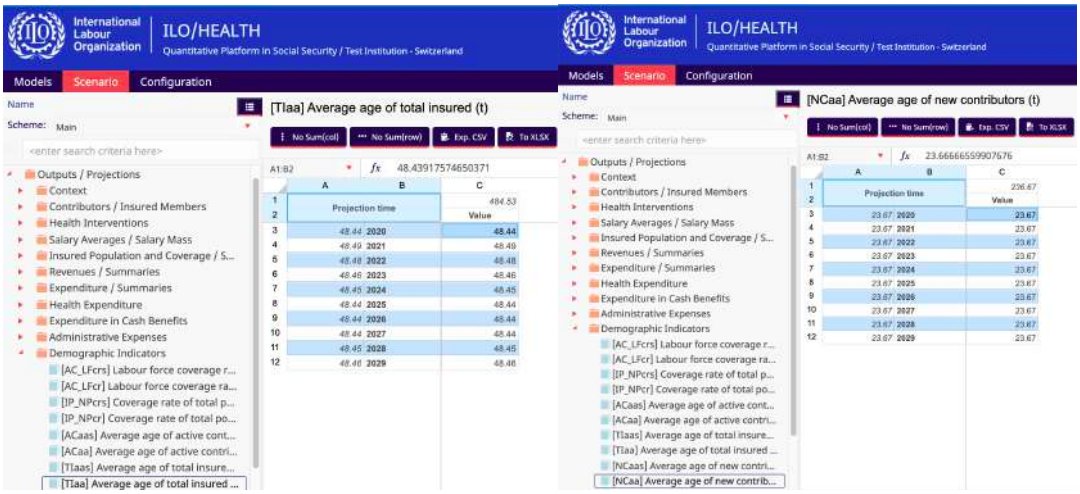
Projection time
Value



6.5.4.2. *Average age*

These indicators ([ACaas] [Acaa], [TIaas], [TIaa], [NCaaas], [NCaa]) show the average age of contributors or beneficiaries by sex over the years. They are found in: Outputs/Projections > Demographic Indicators. This is useful to assess the characteristics of typical insured or contributors and their changes over time (e.g., ageing of the contributors, etc).



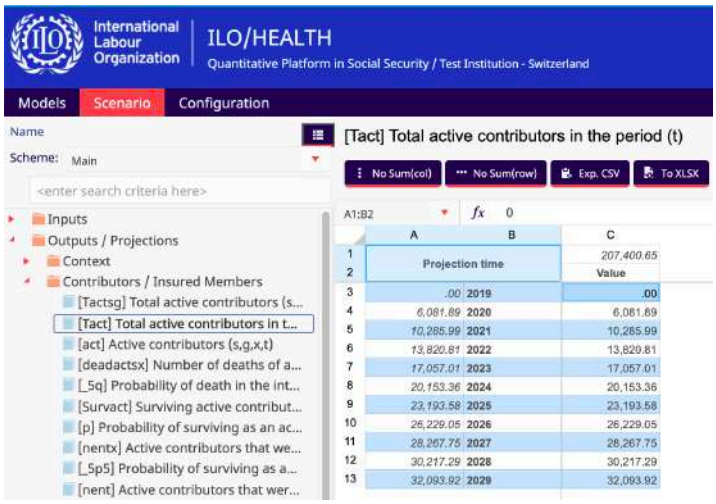


6.5.5. Contributors and insured members

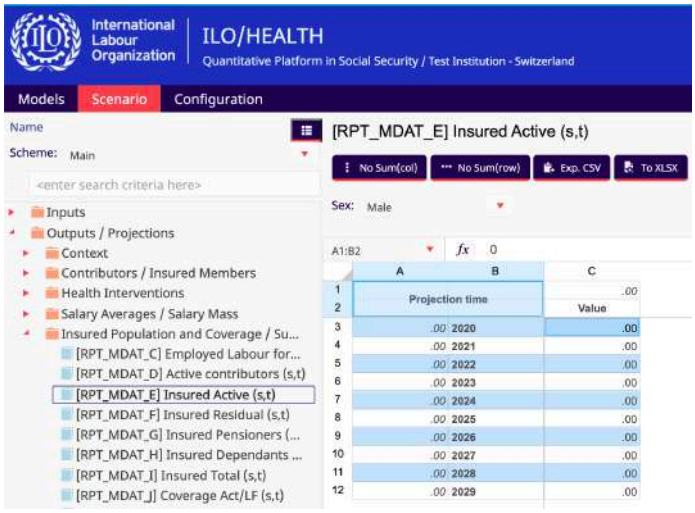
The main aggregate groups for contributors are accessible in varying levels of detail for users interested in understanding group dynamics.

6.5.5.1. *Yearly aggregates by sex and group*

This is the simplest level of detail possible: a time series by sex that shows the total number of individuals of a group without age details. This level of detail is available for Total number of Active contributors of a group [Tact] in the folder Outputs/Projections > Contributors/Insured members, Total insured from active [RPT_MDAT_E] and Total Insured Pensioners [RPT_MDAT_G] in a group by sex[39] in the folder Outputs/Projections > Insured Population and Coverage / Summaries.



[39] For the total, users can easily refer to the Main Aggregate Demographic Table.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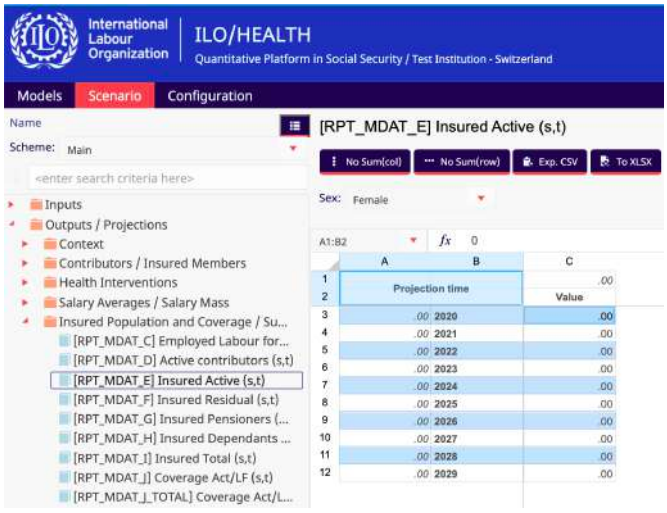
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / Su...
[RPT_MDAT_C] Employed Labour for...
[RPT_MDAT_D] Active contributors (s,t)
[RPT_MDAT_E] Insured Active (s,t)
[RPT_MDAT_F] Insured Residual (s,t)
[RPT_MDAT_G] Insured Pensioners (...
[RPT_MDAT_H] Insured Dependants ...
[RPT_MDAT_I] Insured Total (s,t)
[RPT_MDAT_J] Coverage Act/LF (s,t)
[RPT_MDAT_E] Insured Active (s,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
A1:B2
Projection time
Value
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029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Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / Su...
[RPT_MDAT_C] Employed Labour for...
[RPT_MDAT_D] Active contributors (s,t)
[RPT_MDAT_E] Insured Active (s,t)
[RPT_MDAT_F] Insured Residual (s,t)
[RPT_MDAT_G] Insured Pensioners (...
[RPT_MDAT_H] Insured Dependants ...
[RPT_MDAT_I] Insured Total (s,t)
[RPT_MDAT_J] Coverage Act/LF (s,t)
[RPT_MDAT_J_TOTAL] Coverage Act/L...
[RPT_MDAT_E] Insured Active (s,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Female
A1:B2
Projection time
Value
2020
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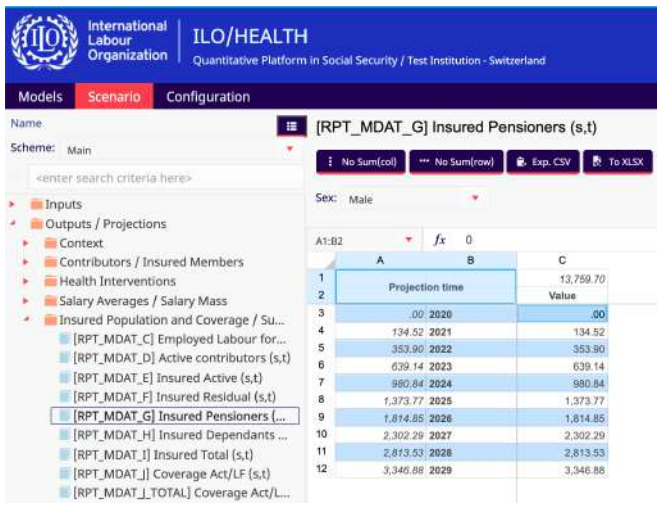
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Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / Su...
[RPT_MDAT_C] Employed Labour for...
[RPT_MDAT_D] Active contributors (s,t)
[RPT_MDAT_E] Insured Active (s,t)
[RPT_MDAT_F] Insured Residual (s,t)
[RPT_MDAT_G] Insured Pensioners (...
[RPT_MDAT_H] Insured Dependants ...
[RPT_MDAT_I] Insured Total (s,t)
[RPT_MDAT_J] Coverage Act/LF (s,t)
[RPT_MDAT_J_TOTAL] Coverage Act/L...
[RPT_MDAT_G] Insured Pensioners (s,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
A1:B2
Projection time
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2020
2021
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2027
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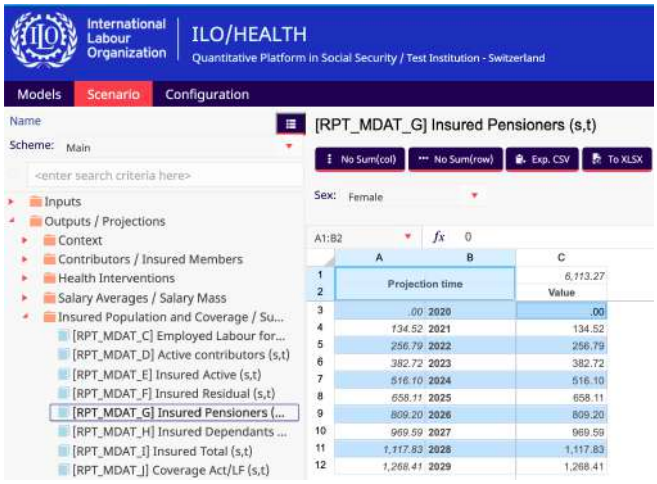
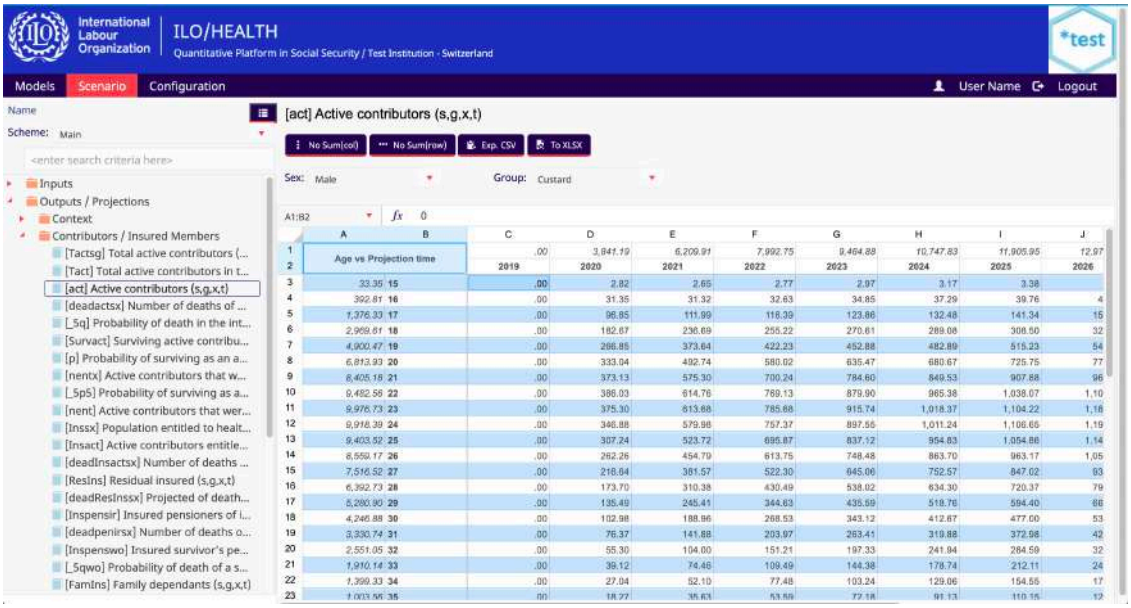
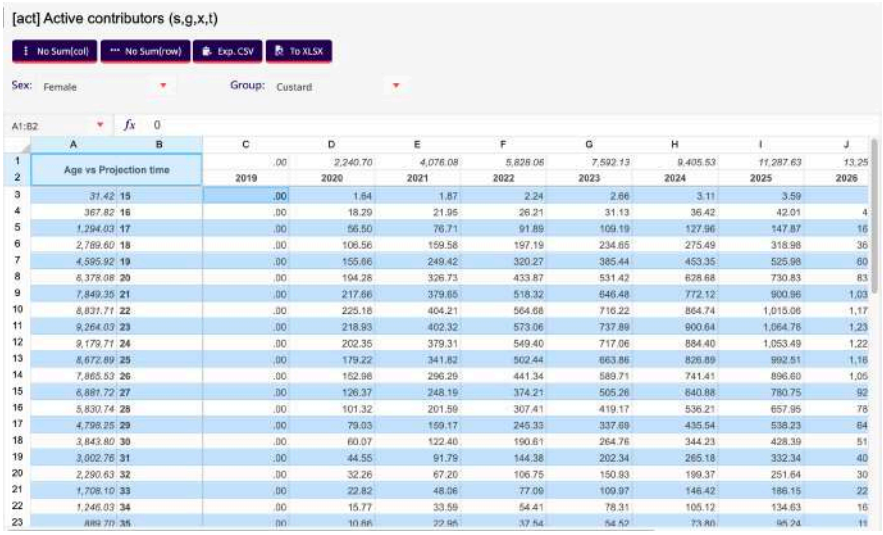
2029

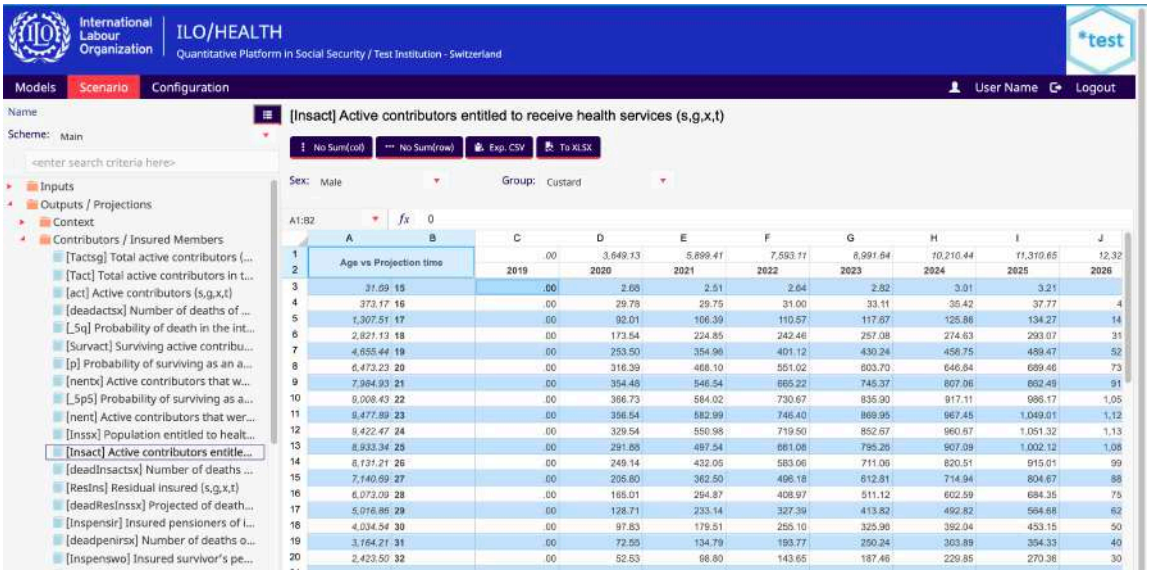


6.5.5.2. *Year and age crosstabs*

These tables show the years in the columns and the age in the rows. This level of detail enables users to view demographic transitions (the "diagonal" ageing of cohorts). These tables are available for the following groups: Active contributors [act], Active insured, Residual insured, Pensioner insured and Family insured ([Insact], [ResIns], [Inspensir], [Inspenswo] and [FamIns]). Other groups shown with this detail are residual groups of contingencies for example: Active contributors that survived death, disability and other exits [Survact], and deaths from the Insured groups, [Tdeath].




[act] Active contributors (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Female
Group: Custard
A1:B2
Age vs Projection time
2019
2020
2021
2022
2023
2024
2025
2026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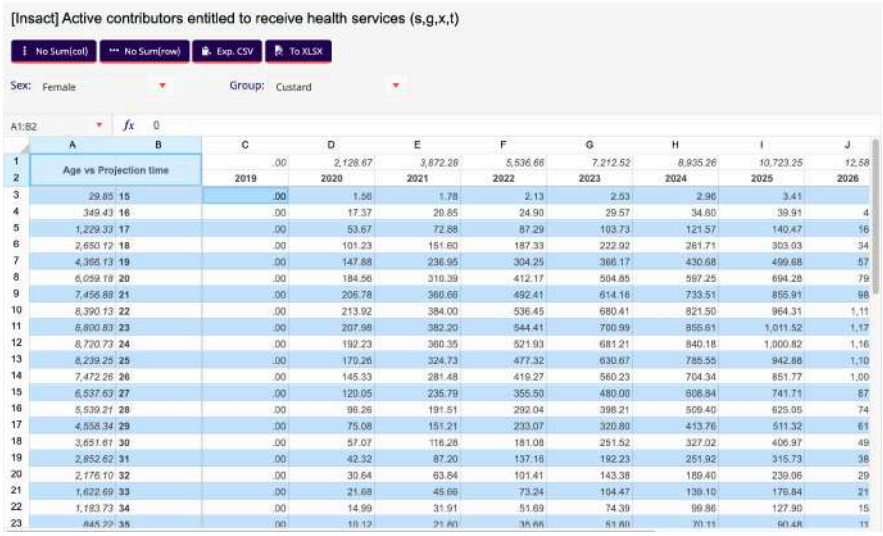
Inputs
Outputs / Projections
Context
Contributors / Insured Members
[Tactsg] Total active contributors (...
[Tact] Total active contributors in t...
[act] Active contributors (s,g,x,t)
[deadactsx] Number of deaths of ...
[_Sq] Probability of death in the int...
[Survact] Surviving active contribu...
[p] Probability of surviving as an a...
[nentx] Active contributors that w...
[_Sp5] Probability of surviving as a...
[nent] Active contributors that wer...
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[Insact] Active contributors entitled to receive health services (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
Age vs Projection time
2019
2020
2021
2022
2023
2024
2025
2026


[Insact] Active contributors entitled to receive health services (s,g,x,t)
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Exp. CSV
To XLSX
Sex: Female
Group: Custard
A1:B2
Age vs Projection time
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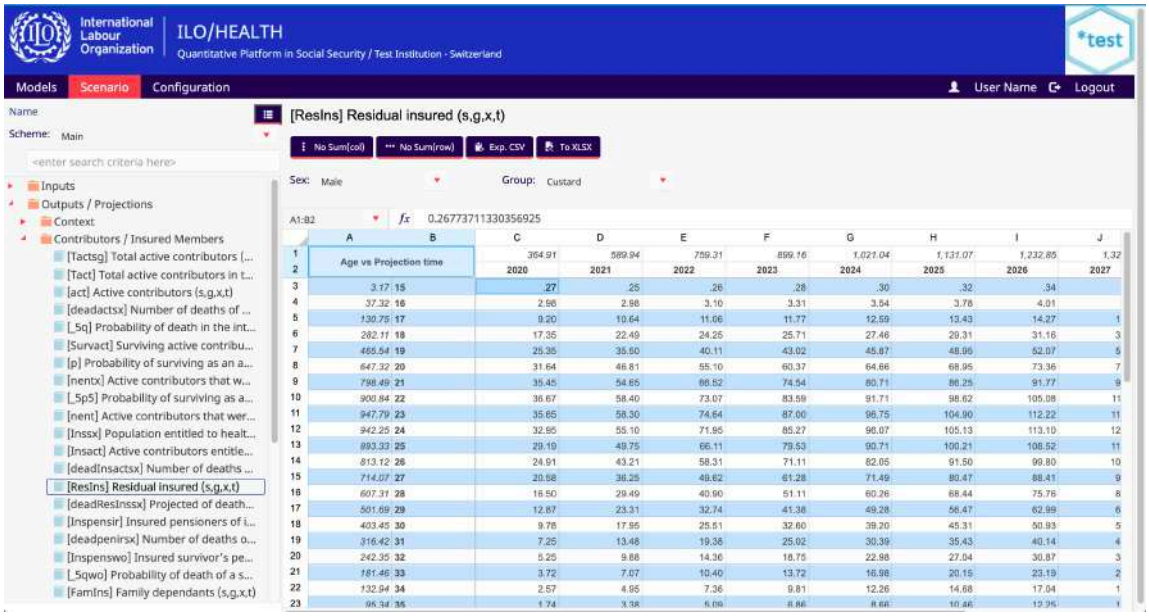
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Contributors / Insured Members
[Tactsg] Total active contributors (...
[Tact] Total active contributors in t...
[act] Active contributors (s,g,x,t)
[deadactsx] Number of deaths of ...
[_5q] Probability of death in the int...
[Survact] Surviving active contribu...
[p] Probability of surviving as an a...
[nentx] Active contributors that w...
[_5p5] Probability of surviving as a...
[nent] Active contributors that wer...
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[_5qwo] Probability of death of a s...
[FamIns] Family dependants (s,g,x,t)
[ResIns] Residual insured (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0.267737113303569 25
Age vs Projection time
2020 2021 2022 2023 2024 2025 2026 2027
3.17 15 .27 .25 .26 .28 .30 .32 .34
37.32 16 2.98 2.98 3.10 3.31 3.54 3.78 4.01
130.75 17 9.20 10.64 11.06 11.77 12.59 13.43 14.27 1
282.11 18 17.35 22.49 24.25 25.71 27.46 29.31 31.16 3
466.54 19 25.35 35.50 40.11 43.02 45.87 48.96 52.07 5
647.32 20 31.64 46.81 55.10 60.37 64.86 68.95 73.36 7
798.49 21 35.45 54.65 66.52 74.54 80.71 86.25 91.77 9
900.84 22 36.67 58.40 73.07 83.59 91.71 98.62 105.08 11
947.79 23 35.65 58.30 74.64 87.00 96.75 104.90 112.22 11
942.25 24 32.95 55.10 71.95 85.27 96.07 105.13 113.10 12
893.33 25 29.10 49.75 66.11 79.53 90.71 100.21 108.52 11
813.12 26 24.91 43.21 58.31 71.11 82.05 91.50 99.80 10
714.07 27 20.68 36.25 49.62 61.28 71.49 80.47 88.41 9
607.31 28 16.50 29.49 40.90 51.11 60.26 68.44 75.76 8
501.69 29 12.87 23.31 32.74 41.38 49.28 56.47 62.99 6
403.45 30 9.78 17.95 25.51 32.60 39.20 45.31 50.93 5
316.42 31 7.25 13.48 19.38 25.02 30.39 35.43 40.14 4
242.35 32 5.25 9.88 14.36 18.75 22.98 27.04 30.87 3
181.46 33 3.72 7.07 10.40 13.72 16.98 20.15 23.19 2
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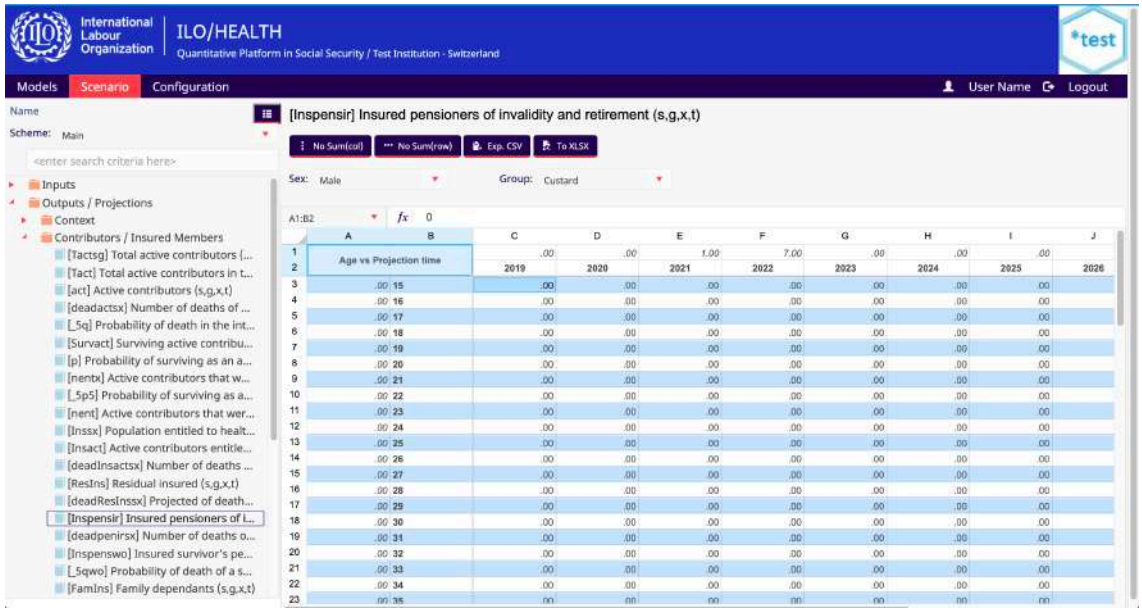
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Scheme: Main
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Inputs
Outputs / Projections
Context
Contributors / Insured Members
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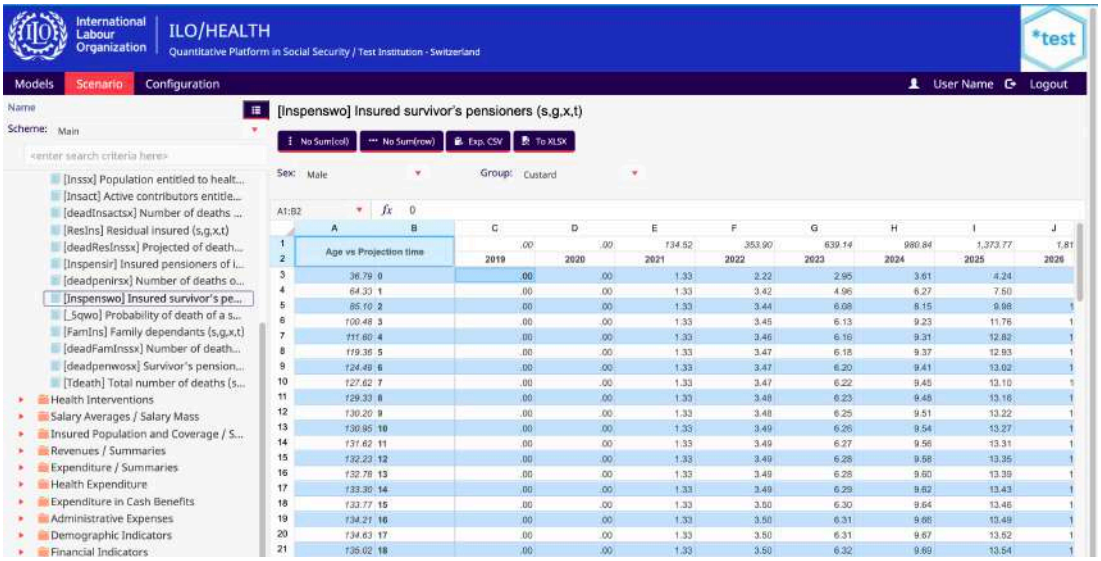
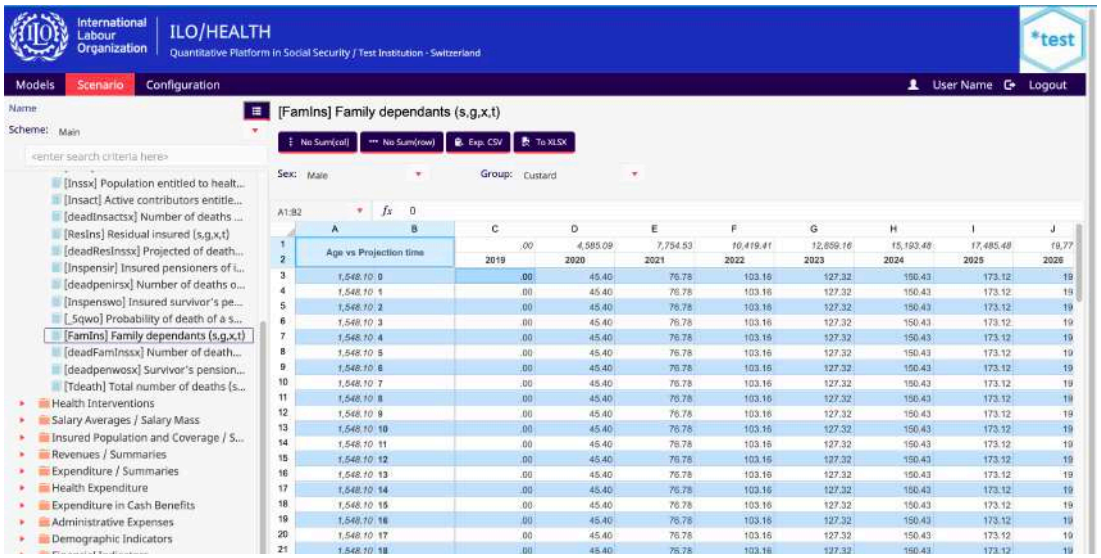
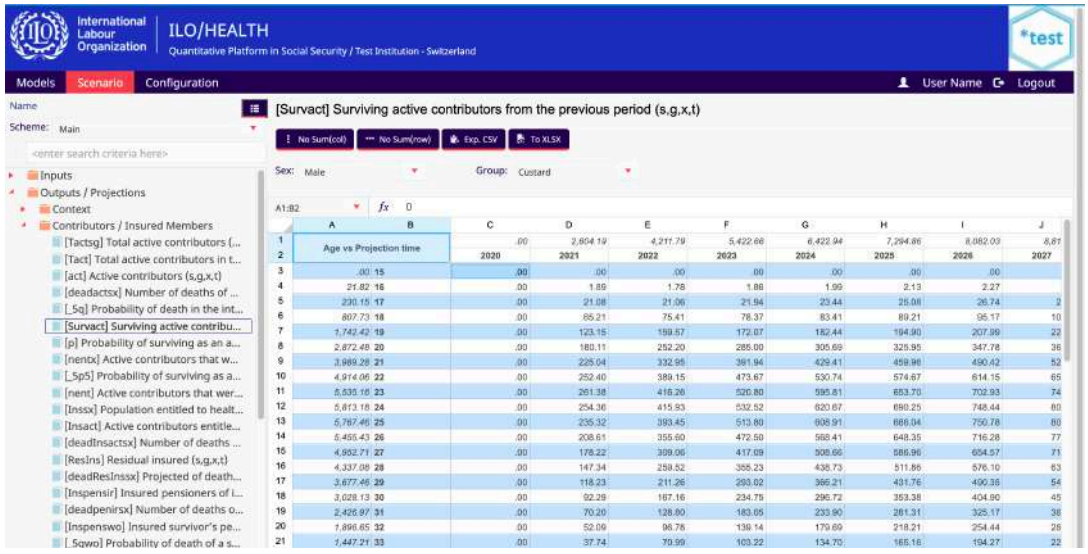
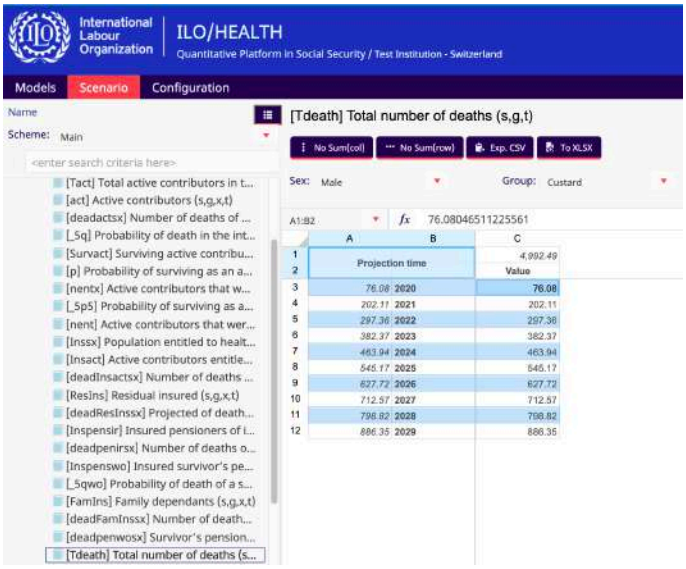
[Tact] Total active contributors in t...
[act] Active contributors (s,g,x,t)
[deadactsx] Number of deaths of ...
[_5q] Probability of death in the int...
[Survact] Surviving active contribu...
[p] Probability of surviving as an a...
[nentx] Active contributors that w...
[_5p5] Probability of surviving as a...
[nent] Active contributors that wer...
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[_5qwo] Probability of death of a s...
[FamIns] Family dependants (s,g,x,t)
[Inspensir] Insured pensioners of invalidity and retirement (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0
Age vs Projection time
2019 2020 2021 2022 2023 2024 2025 2026
.00 15 .00 .00 .00 .00 .00 .00 .00 .00
.00 16 .00 .00 .00 .00 .00 .00 .00 .00
.00 17 .00 .00 .00 .00 .00 .00 .00 .00
.00 18 .00 .00 .00 .00 .00 .00 .00 .00
.00 19 .00 .00 .00 .00 .00 .00 .00 .00
.00 20 .00 .00 .00 .00 .00 .00 .00 .00
.00 21 .00 .00 .00 .00 .00 .00 .00 .00
.00 22 .00 .00 .00 .00 .00 .00 .00 .00
.00 23 .00 .00 .00 .00 .00 .00 .00 .00
.00 24 .00 .00 .00 .00 .00 .00 .00 .00
.00 25 .00 .00 .00 .00 .00 .00 .00 .00
.00 26 .00 .00 .00 .00 .00 .00 .00 .00
.00 27 .00 .00 .00 .00 .00 .00 .00 .00
.00 28 .00 .00 .00 .00 .00 .00 .00 .00
.00 29 .00 .00 .00 .00 .00 .00 .00 .00
.00 30 .00 .00 .00 .00 .00 .00 .00 .00
.00 31 .00 .00 .00 .00 .00 .00 .00 .00
.00 32 .00 .00 .00 .00 .00 .00 .00 .00
.00 33 .00 .00 .00 .00 .00 .00 .00 .00
.00 34 .00 .00 .00 .00 .00 .00 .00 .00
.00 35 .00 .00 .00 .00 .00 .00 .00 .00


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
[Inspenswo] Insured survivor's pensioners (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[_Sqwo] Probability of death of a s...
[FamIns] Family dependants (s,g,x,t)
[deadFamInssx] Number of death...
[deadpenwosx] Survivor's pension...
[Tdeath] Total number of deaths (s...
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators
Financial Indicators

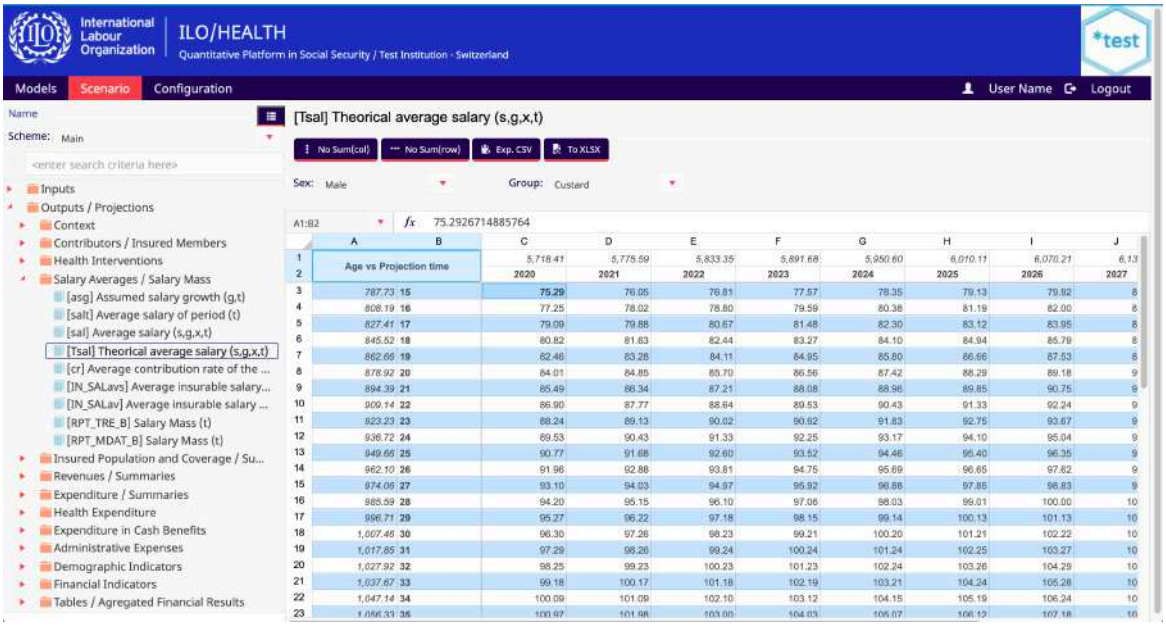

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
[FamIns] Family dependants (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[_Sqwo] Probability of death of a s...
[FamIns] Family dependants (s,g,x,t)
[deadFamInssx] Number of death...
[deadpenwosx] Survivor's pension...
[Tdeath] Total number of deaths (s...
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators

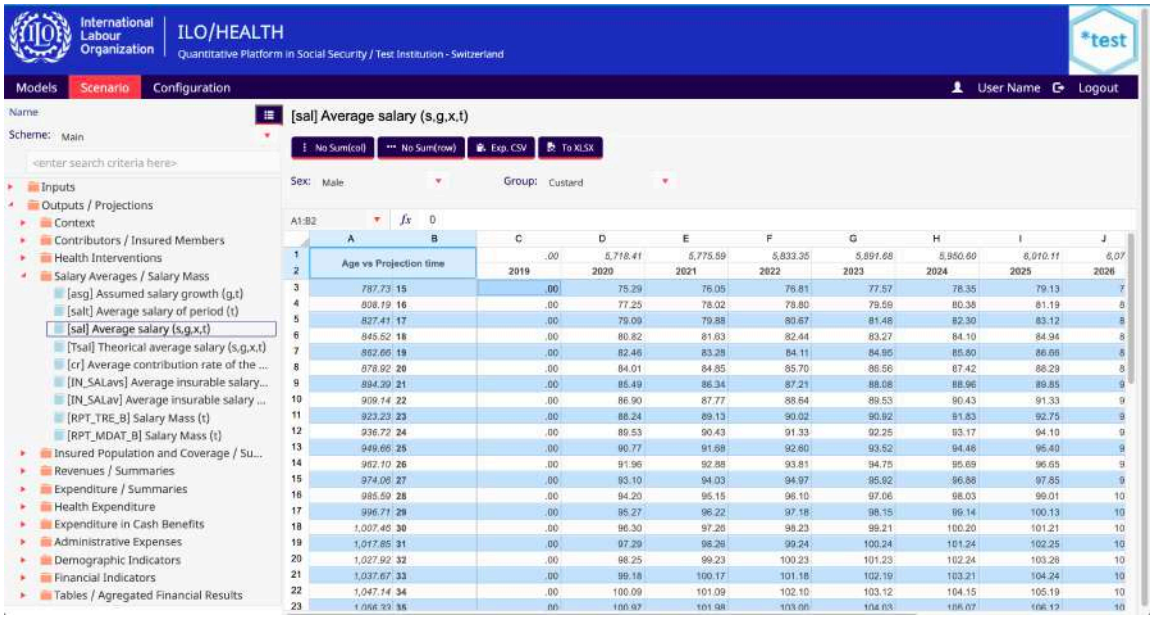

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
[Survact] Surviving active contributors from the previous period (s,g,x,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Inputs
Outputs / Projections
Context
Contributors / Insured Members
[Tactsg] Total active contributors (...
[Tact] Total active contributors in t...
[act] Active contributors (s,g,x,t)
[deadactsx] Number of deaths of ...
[_Sq] Probability of death in the int...
[Survact] Surviving active contribu...
[p] Probability of surviving as an a...
[nentx] Active contributors that w...
[_Sp5] Probability of surviving as a...
[nent] Active contributors that wer...
[Inssx] Population entitled to healt...
[Insact] Active contributors entitle...
[deadInsactsx] Number of deaths ...
[ResIns] Residual insured (s,g,x,t)
[deadResInssx] Projected of death...
[Inspensir] Insured pensioners of i...
[deadpenirsx] Number of deaths o...
[Inspenswo] Insured survivor's pe...
[_Sqwo] Probability of death of a s...

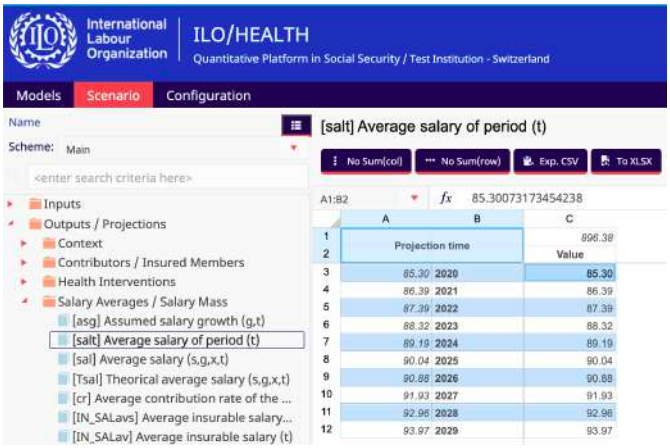


6.5.6. Salary matrices

Similarly, the salary matrices relate income to age for active contributors. There are three salary matrices: [Tsal] contains the Theoretical salary and [sal] contains Projected salary. Both are shown by age and sex for each group over a given year, with years shown in columns and age in rows. Additionally, there is the average Salary of the group [salt]. They are found in: Outputs/Projections > Salary Averages / Salary Mass.



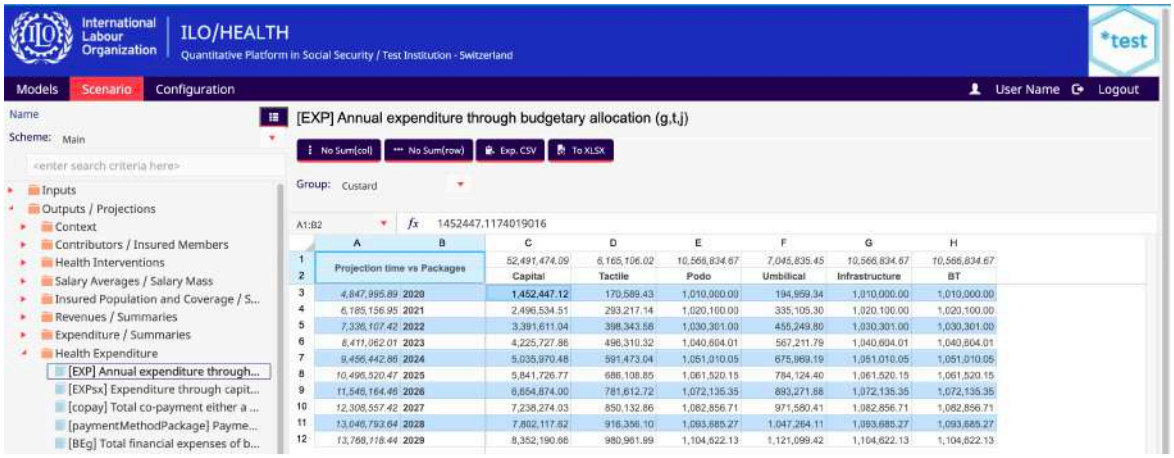


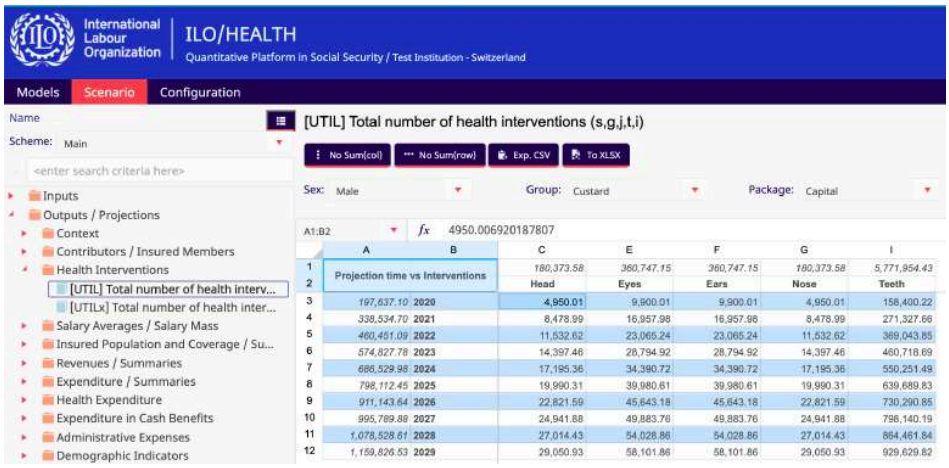


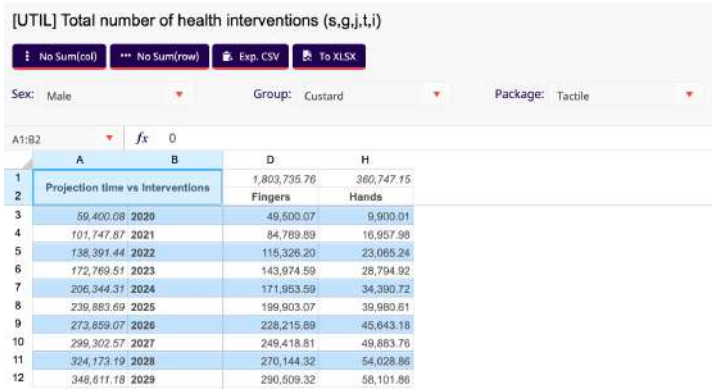
6.5.7. Expenditures

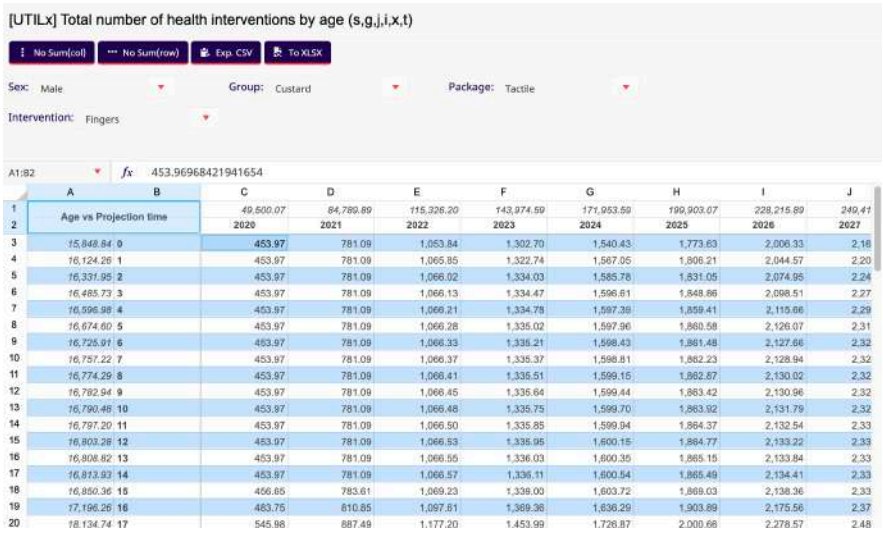
6.5.7.1. *Healthcare expenditures*

Users can assess the total expenditure per package in the matrix [EXP] in Outputs/Projections > Health Expenditure. More details on the number of interventions for healthcare services paid for each intervention are found in the matrix [UTIL]. Age details are available in [UTILx]. Both are found in the section Outputs/Projections > Health Interventions.


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
*test
Models
Scenario
Configuration
User Name
Logout
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
[EXP] Annual expenditure through...
[EXPsx] Expenditure through capit...
[copay] Total co-payment either a ...
[paymentMethodPackage] Payme...
[BEg] Total financial expenses of b...
[EXP] Annual expenditure through budgetary allocation (g,t,j)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Group: Custard
A1:B2
1452447,1174019016
Projection time vs Packages
Capital
Tactile
Podo
Umbilical
Infrastructure
BT
4,847,995.89 2020
1,452,447.12
170,589.43
1,010,000.00
194,959.34
1,010,000.00
1,010,000.00
6,185,156.95 2021
2,496,534.51
293,217.14
1,020,100.00
335,105.30
1,020,100.00
1,020,100.00
7,336,107.42 2022
3,391,611.04
398,343.58
1,030,301.00
455,249.80
1,030,301.00
1,030,301.00
8,411,062.01 2023
4,225,727.86
496,310.32
1,040,604.01
567,211.79
1,040,604.01
1,040,604.01
9,456,442.86 2024
5,035,970.48
591,473.04
1,051,010.05
675,969.19
1,051,010.05
1,051,010.05
10,496,520.47 2025
5,841,726.77
686,108.85
1,061,520.15
784,124.40
1,061,520.15
1,061,520.15
11,546,164.46 2026
6,654,874.00
781,612.72
1,072,135.35
893,271.58
1,072,135.35
1,072,135.35
12,308,557.42 2027
7,238,274.03
850,132.86
1,082,856.71
971,580.41
1,082,856.71
1,082,856.71
13,046,793.64 2028
7,802,117.62
916,356.10
1,093,685.27
1,047,264.11
1,093,685.27
1,093,685.27
13,768,118.44 2029
8,352,190.66
980,961.99
1,104,622.13
1,121,099.42
1,104,622.13
1,104,622.13

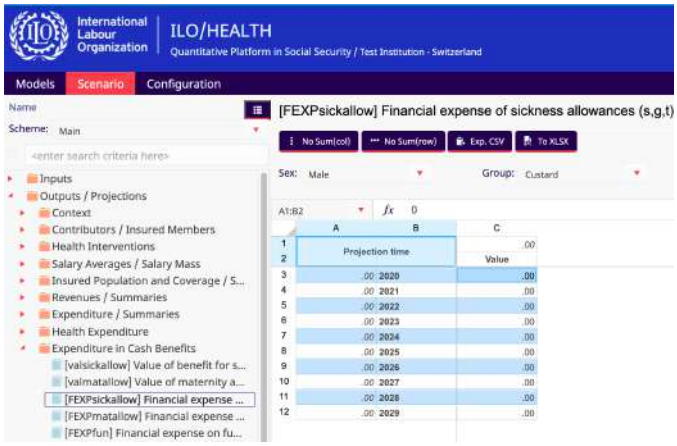

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
[UTIL] Total number of health interv...
[UTILx] Total number of health inter...
Salary Averages / Salary Mass
Insured Population and Coverage / Su...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
Administrative Expenses
Demographic Indicators
[UTIL] Total number of health interventions (s,g,j,t,i)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Capital
A1:B2
4950.006920187807
Projection time vs Interventions
180,373.58
360,747.15
360,747.15
180,373.58
5,771,954.43
Head
Eyes
Ears
Nose
Teeth
197,637.10 2020
4,950.01
9,900.01
9,900.01
4,950.01
158,400.22
338,534.70 2021
8,478.99
16,957.98
16,957.98
8,478.99
271,327.66
460,451.09 2022
11,532.62
23,065.24
23,065.24
11,532.62
369,043.85
574,827.78 2023
14,397.46
28,794.92
28,794.92
14,397.46
460,718.69
686,529.98 2024
17,195.36
34,390.72
34,390.72
17,195.36
550,251.49
798,112.45 2025
19,990.31
39,980.61
39,980.61
19,990.31
639,689.83
911,143.64 2026
22,821.59
45,643.18
45,643.18
22,821.59
730,290.85
995,789.88 2027
24,941.88
49,883.76
49,883.76
24,941.88
798,140.19
1,078,528.61 2028
27,014.43
54,028.86
54,028.86
27,014.43
864,461.84
1,159,826.53 2029
29,050.93
58,101.86
58,101.86
29,050.93
929,629.82

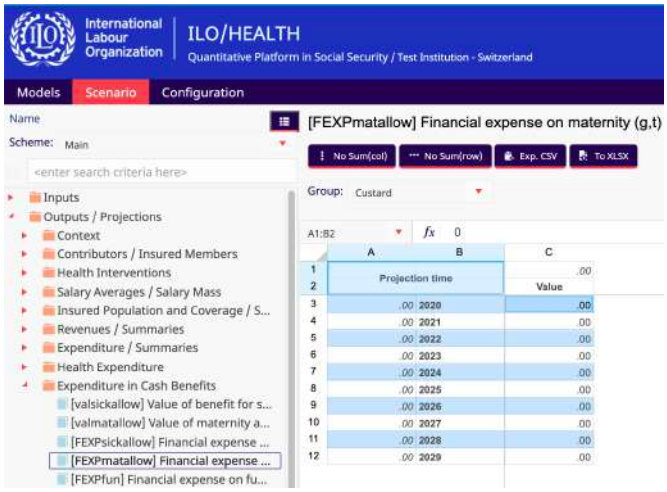

[UTIL] Total number of health interventions (s,g,j,t,i)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
Package: Tactile
A1:B2
0
Projection time vs Interventions
1,803,735.76
360,747.15
Fingers
Hands
59,400.08 2020
49,500.07
9,900.01
101,747.87 2021
84,789.89
16,957.98
138,391.44 2022
115,326.20
23,065.24
172,769.51 2023
143,974.59
28,794.92
206,344.31 2024
171,953.59
34,390.72
239,883.69 2025
199,903.07
39,980.61
273,859.07 2026
228,215.89
45,643.18
299,302.57 2027
249,418.81
49,883.76
324,173.19 2028
270,144.32
54,028.86
348,611.18 2029
290,509.32
58,101.86

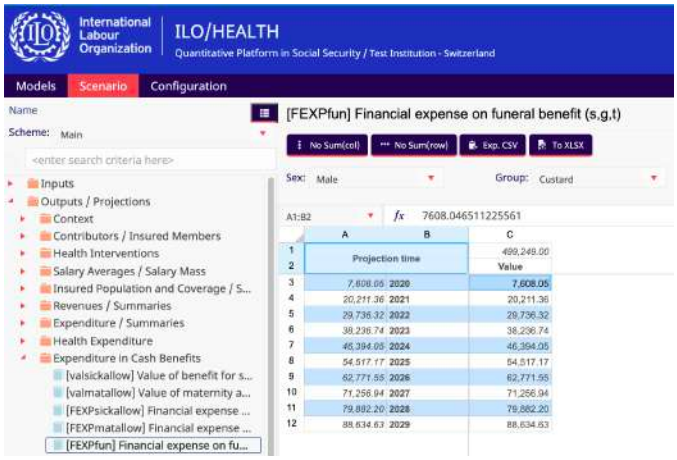


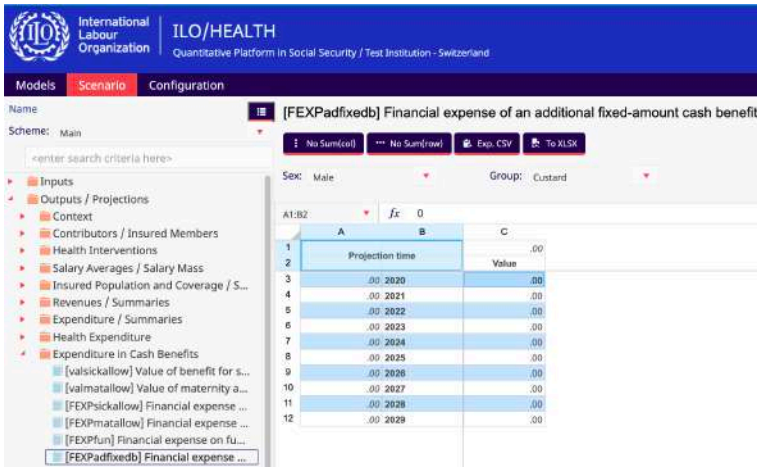
6.5.7.2. *Cash benefit expenditure*

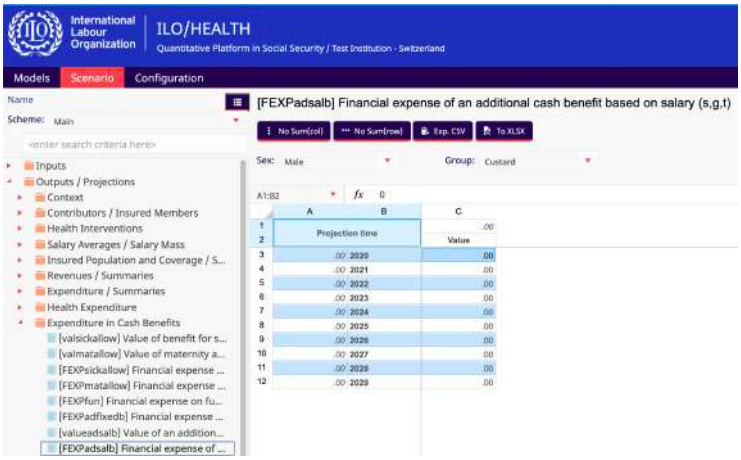
The matrices [FEXPsickallow], [FEXPmatallow], [FEXPfun], [FEXPadfixedb], [FEXPadsaldb] show the total annual expenditure by sex for sickness benefits, maternity benefits, funeral benefits, fixed ad hoc benefits, and ad hoc benefits calculated as a proportion of the salary. [BEN_EXP_CASHs] shows the total cash benefits and [BEN_EXP_CASH] shows total for both sexes. All these matrices are found in: Outputs/Projections > Expenditure on Cash Benefits.

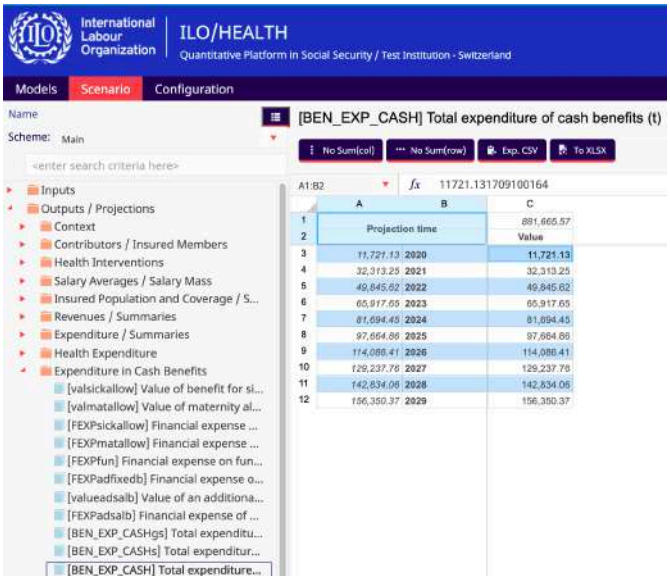

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
[valsickallow] Value of benefit for s...
[valmatallow] Value of maternity a...
[FEXPsickallow] Financial expense ...
[FEXPmatallow] Financial expense ...
[FEXPfun] Financial expense on fu...
[FEXPsickallow] Financial expense of sickness allowances (s,g,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
0
Projection time
Value
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029

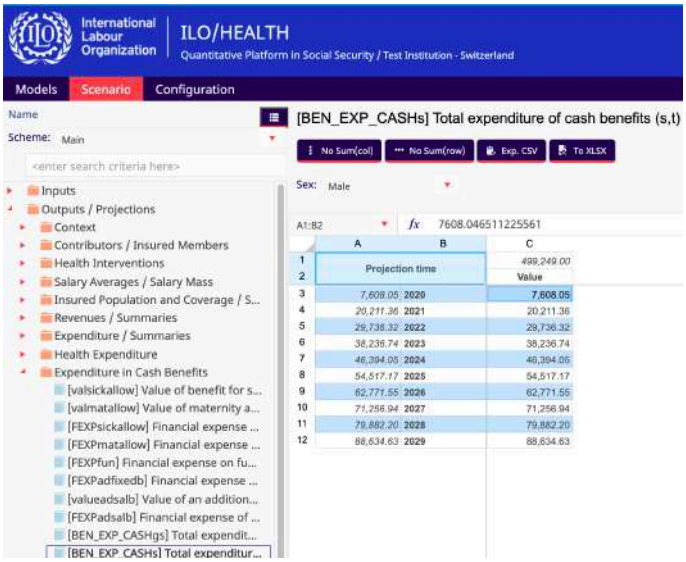

International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
[valsickallow] Value of benefit for s...
[valmatallow] Value of maternity a...
[FEXPsickallow] Financial expense ...
[FEXPmatallow] Financial expense ...
[FEXPfun] Financial expense on fu...
[FEXPmatallow] Financial expense on maternity (g,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Group: Custard
A1:B2
0
Projection time
Value
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
[valsickallow] Value of benefit for s...
[valmatallow] Value of maternity a...
[FEXPsickallow] Financial expense ...
[FEXPmatallow] Financial expense ...
[FEXPfun] Financial expense on fu...
[FEXPfun] Financial expense on funeral benefit (s,g,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
Group: Custard
A1:B2
7608.046511225561
Projection time
Value
499,248.00
7,608.05 2020
20,211.36 2021
29,736.32 2022
38,236.74 2023
46,394.05 2024
54,517.17 2025
62,771.55 2026
71,256.94 2027
79,882.20 2028
88,634.63 2029


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[FEXPadfixedb] Financial expense of an additional fixed-amount cash benefit
Projection time
Value


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[FEXPadsalb] Financial expense of an additional cash benefit based on salary (s,g,t)
Projection time
Value


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
[BEN_EXP_CASH] Total expenditure of cash benefits (t)
Projection time
Value


International Labour Organization
ILO/HEALTH
Quantitative Platform in Social Security / Test Institution - Switzerland
Models
Scenario
Configuration
Name
Scheme: Main
<enter search criteria here>
Inputs
Outputs / Projections
Context
Contributors / Insured Members
Health Interventions
Salary Averages / Salary Mass
Insured Population and Coverage / S...
Revenues / Summaries
Expenditure / Summaries
Health Expenditure
Expenditure in Cash Benefits
[valsickallow] Value of benefit for s...
[valmatallow] Value of maternity a...
[FEXPsickallow] Financial expense ...
[FEXPmatallow] Financial expense ...
[FEXPfun] Financial expense on fu...
[FEXPadfixedb] Financial expense ...
[valueadsalb] Value of an addition...
[FEXPadsalb] Financial expense of ...
[BEN_EXP_CASHgs] Total expendit...
[BEN_EXP_CASHs] Total expenditur...
[BEN_EXP_CASHs] Total expenditure of cash benefits (s,t)
No Sum(col)
No Sum(row)
Exp. CSV
To XLSX
Sex: Male
A1:B2
7608.046511225561
Projection time
Value
499,249.00
7,608.05 2020 7,608.05
20,211.36 2021 20,211.36
29,736.32 2022 29,736.32
38,236.74 2023 38,236.74
46,394.05 2024 46,394.05
54,517.17 2025 54,517.17
62,771.55 2026 62,771.55
71,256.94 2027 71,256.94
79,882.20 2028 79,882.20
88,634.63 2029 88,634.63

6.6. ILO/HEALTH platform cheat sheet

The table below lists a summary of the commands available to users in ILO/HEALTH.

Function Name	Purpose	Method
Check Out	Enables users to make changes to a given matrix (worksheet)	Check Out
Check In	Saves changes to the worksheet, enables other users to make changes to the matrix	Check In
Undo Check Out	Signs out of a matrix without saving any changes	Undo Check Out. Available until users press Save.
Save	Saves all changes made to a checked-out matrix	Save
Hide/Show Sums	Hides or shows a row or column that displays the sum of values in that row/column	Hide/Show accordingly (purely aesthetic; does not remove the row/column)
Copy using menu	Copies values of a given row or column to a set number of rows or columns that follow, or to the end of the respective row/column	Use the menu to copy a row or column. Select "Number of copies" to specify how many times to duplicate the value. Check the "Copy to the end" box to copy to the end.
Copy using Ctrl+C	Allows users to copy information from a cell/row/column to another of the same size	Ctrl+C (Cmd+C on Mac)
Paste	Allows users to copy information from a cell/row/column to another of the same size	Ctrl+V (Cmd+V on Mac)
Clean	Erases all information written in a matrix	Clean
Export as CSV/XLS	Exports matrix as a csv/xls file	Exp. CSV/XLS
Import as CSV	Imports a csv file into a given matrix	Imp. CSV and select the file to upload from the file browser. Imported file dimensions must match the matrix dimensions, and imported files must be in csv.
"+" sign on right bottom corner of a cell	Allows users to copy information from a given cell to the next row/column (one at a time).	Hover over the cell until the + sign appears at the bottom right corner. Hold and drag down to the right to copy information. This function can be used for a numeric value or a formula.

7. Consistency review

This section is for:

- *Practitioners/Users of ILO/HEALTH, especially those consulting results, conducting consistency reviews and writing reports*

In this section, users will learn:

- *How to carry out a consistency review of demographic projections*
- *How to carry out a consistency review of financial projections*

As mentioned in section 2.5.1, reviewing the consistency of the model results is a critical stage of actuarial work. If this stage of the process is not carried out rigorously, the success of an actuarial valuation may be at risk. For example, the presentation of results that may appear inconsistent at first glance, without proper justification, may call into question the quality of the work and its validity for making policy decisions, particularly in complex national political scenarios.

This chapter offers details on the basic elements that should be considered as part of any consistency review process.

ILO/HEALTH has an extensive set of indicators and variable outputs to assist and facilitate the consistency review. Users are advised to use ILO/HEALTH tools for graphing indicators to better analyse trends according to different dimensions: sex, age, type of healthcare benefit, salaries, benefit amounts and relative structures, among others.

7.1. Review of demographic results

7.1.1. Projection of active and inactive contributors (members) according to labour force size

a) Verify that the number of contributors by sex and the total are consistent with the projections of the labour force by year and sex. It is advisable to use the country's official population projections. Also check for consistency with historical trends.

7.1.2. Projection of scheme beneficiaries

a) **By sex, population group and total.** This is expected to show a smooth upward trend; otherwise, the analysis should explain the deviations from the recent trend.

b) **Relative distribution of beneficiaries and contributors by sex, population group and total.** It is expected that the relative structure of populations will change gradually and smoothly, tending towards stabilization in the long term. If any major changes are observed, they should be analysed and explained.

7.1.3. Check changes in the following indicators, which should be consistent with the assumptions by population group, sex and projection year

a) Labour force coverage rate, total and by sex (active contributors as a proportion of the labour force).

b) Coverage rate of the total insured population, total and by sex. Total covered population (insured assets + family dependants + other groups) as a proportion of the total population.

c) Average age of active contributors, by sex.

d) Average age of protected population (contributory and non-contributory), by sex.

e) Average age of new contributors, by sex.

f) Age distribution (percentages) of the total insured population (contributors and family dependants), by age group, sex and year of projection.

7.2. Review of financial results

7.2.1. PAYG premium rate (ratio of expenditure as a percentage of insurable wages)

a) The PAYG premium rate by sex, type of benefit and total is expected to show a smooth trend; otherwise, the analysis should explain the reasons for the trend, especially abrupt deviations from medium- and long-term trends.

b) Verify that the PAYG premium rate follows a smooth trend in the direction expected in accordance with observed trends, recent reforms and assumptions.

7.2.2. GDP growth, wages and average expenditure per capita and per healthcare package or healthcare intervention

There must be consistency over time between the assumptions on GDP growth, the rate of wage increase (which is theoretically linked to long-term labour productivity trends), the rate of adjustment of healthcare costs or fees and the inflation rate. The following relationships must always be respected:

$$(real\ growth\ rate)_t = \frac{1+(nominal\ growth\ rate)_t}{1+\ inflation_t} - 1 \text{ or, where applicable,}$$
$$(nominal\ growth\ rate)_t = (1 + (real\ growth\ rate)_t)(1 + inflation_t) - 1$$

7.2.3. Salaries and healthcare expenditures

Check trends of the following indicators, which should be consistent with the assumptions by sex and year of projection:

a) Average insurable salary (or labour income), total and by sex.

b) Annual growth rate of the average insurable salary, total and by sex.

c) Administrative expenditure at time t as a proportion of expenditure on healthcare benefits.

d) Total expenditure on healthcare and cash benefits.

e) Expenditure on healthcare and cash benefits as a percentage of GDP.

f) Total expenditure (including administrative expenditures) as a percentage of GDP.

g) Annual growth rate of total expenditures (including administrative expenditures), by scheme.

h) Reserve ratio, where applicable.

i) Total healthcare expenditure by population group (sum up of all healthcare expenditure categories).

j) Percentage of total healthcare expenditures for each healthcare package by population group (sum of all healthcare expenditure categories).

k) Expenditure as a percentage of GDP:

   (i) Healthcare expenditure as a percentage of GDP;

   (ii) Sickness benefit expenditure as a percentage of GDP;

   (iii) Maternity benefit expenditure as a percentage of GDP;

   (iv) Funeral benefit expenditure as a percentage of GDP;

   (v) Additional fixed-amount benefits expenditure as a percentage of GDP; and

   (vi) Additional salary-based benefit expenditure as a percentage of GDP.

l) Expenditure as a percentage of government expenditure:

   (i) Healthcare expenditure as a percentage of government expenditure;

   (ii) Sickness benefit expenditure as a percentage of government expenditure;

   (iii) Maternity benefit expenditure as a percentage of government expenditure;

   (iv) Funeral benefit expenditure as a percentage of government expenditure; and

   (v) Additional fixed-amount benefits expenditure as a percentage of government expenditure.

Annex I: List of Variables for ILO/HEALTH

Category	Reference	Description
Inputs		
Demographic, economic and labour force		
1	NATPOP	National population (s,t)
2	Partr	Participation rate (s,t)
3	unemrate	Unemployment rate (s,t)
4	ggdp	Input Gross Domestic Product rate (t)
5	ggex	Input Government expenditure (t)
6	IGDP	Initial Gross Domestic Product (t)
7	inf	Inflation rate expressed as a proportion (t)
Coverage		
8	cov	Coverage rate as a proportion of the employed labour force (s,g,t)
Contributors		
9	lact	Initial cohort of active contributors (s,g,x)
10	q	Death probabilities (s,g,x,t)
11	ret	Disability and retirement probabilities (s,g,x,t)
12	er	Exit probabilities (s,g,x,t)
13	ne	Age distribution of new entrants (s,g,x,t)
Salaries - average and growth rates		
14	lsal	Monthly initial average salary (s,g,x)
15	ITsal	Initial theoretical average salary curve (s,g,x)
16	asg_in	Assumed salary growth rate (g,t)
Contribution rates and average contribution months		
17	crg	Contribution rate expressed as a proportion (g,t)
18	contmonths	Months of contribution per year (g,t)
Population entitled to healthcare services Projection		
19	iract	Insurance rate of active contributors (s,g,x,t)
20	irres	Insured residual active contributors as a percentage of insured active contributors (s,g,x,t)
21	linspensir	Initial insured pensioners of disability and retirement (s,g,x)
22	linspenswo	Initial insured survivors pensioners (widow(er)s and orphans) (s,g,x)
23	qir	Probability of death of an insured pensioner of disability or retirement (s,x,t)
24	famact	Expected number of survivors from death of active contributor (sc,s,g,xc,x)
25	fampens	Expected number of survivors from death of a pensioner (sr,s,g,xr,x)
26	included	Value of 1 or 0 depending on whether population k of group g is entitled to healthcare service (g,k)
27	qwo	Probability of death of a survivor pensioner (s,x,t)
Healthcare expenditure		
28	IEXP	Initial annual expenditure through budgetary allocation (g,j)
29	aegba	Assumed annual growth rate of expenditure through budgetary allocation (g,j,t)
30	perfr	Proportion of annual expenditure representing the performance cost (g,t,j)
31	aepGDP	Proportion of GDP representing expenditure through budgetary allocation (g,t,j)
32	aepGEX	Percentage of GEX representing expenditure through budgetary allocation (g,t,j)
Cash benefit expenditure		
33	minsickallow	Minimum value of benefit for sickness allowances in absolute terms (t)
34	maxsickallow	Maximum value of benefit for sickness allowances in absolute terms (t)
35	brsickallow	Benefit rate for sickness allowances (t)
36	freqsickallow	Annual frequency of access to sickness benefits (s,g,x,t)
37	minmatallow	Minimum value of benefit for maternity allowances in absolute terms (t)

38	maxmatallow	Maximum value of benefit for maternity allowances in absolute terms (t)
39	brmatallow	Benefit rate for maternity benefits (t)
40	freqmatallow	Annual frequency of access to maternity benefits (g,x,t)
41	funben	Funeral benefit
42	fbp	Funeral benefit participation of population (g,k)
43	freqadfixedb	Annual frequency (average by active contributor) of claims of an additional fixed-amount cash benefit (s,g,x,t)
44	valueadfixedb	Value of an additional fixed-amount cash benefit (g,t)
45	minadsalb	Minimum value of an additional cash benefit based on salary (t)
46	maxadsalb	Maximum value of an additional cash benefit based on salary (t)
47	d	Proportion of salary paid for an additional cash benefit based on salary (t)
48	freqadsalb	Annual frequency of access to an additional cash benefit based on salary (s,g,x,t)
Other expenditures		
49	adm	Percentage over benefit expense for calculation of administrative expenditure (t)
50	OExp	Other expenditures (external projection of absolute monetary values) (t).
Costs or fees for healthcare services		
51	expcap	Per capita payment for capitation (s,g,j,x,t)
52	costint	Unit cost per intervention (g,j,i,x,t)
53	copayfix	Fix amount of co-payment per intervention (s,g,j,i,x,t)
54	copayrate	Co-payment as a percentage of the cost of the intervention (s,g,j,x,t)
Healthcare service use frequencies and eoverage		
55	freqint	Expected number of interventions per year (s,g,j,i,x,t)
56	dimen	Parameter for additional dimension of analysis (s,g,j,i,x,t)
57	hospdays	Average days per hospital stay (s,g,j,i,x,t)
58	eventcov	Event coverage (s,g,j,x,t)
59	capcov	Capitation coverage (s,g,j,x,t)
Government transfers and other revenue		
60	GT	Government transfers (g,t)
61	ORev	Other revenue (t)
Reserve fund and interest rate		
62	IRES	Initial reserve fund (t)
63	i_rate	Interest rate of the reserve fund (t)
Historical information series		
64	HTP	Total population, by sex (s,t)
65	HWEP	Working-age population (s,t)
66	HLF	Labour force (employed population), by sex (s,t)
67	HAC	Active contributors, by sex (s,t)
68	HINS	Insured population (s,t)
69	HMS	Minimum salary (t)
70	HCS	Average contributory salary (s,t)
71	HBEN_EXP_HEALTH	Expenditure on health benefits (s,t)
72	HBEN_EXP_CASH	Expenditure on cash benefits (s,t)
73	HCASHBav	Average cash benefit (s,t)
74	HAdCost	Administrative expenses (t)
75	Htrev	Total revenue (t)
76	HCONT	Contribution revenue (t)
77	HIntRev	Interest revenue (t)
78	HGT	Revenue from government transfers (t)
79	HBS_ContExp	Balance sheet on contributions and expenditure: revenue less expenditure on contributions (t)
80	HTBS_RevExp	Total balance sheet: total revenue minus total expenditure (t)
81	HRES	Reserve fund (t)
82	rep	Average replacement rate (g,t)
Healthcare packages (from configuration)		

83	ia	Initial ages for population group and healthcare packages (g,j)
84	fa	Maximum ages for population group and healthcare packages (g,j)
85	pn	Number of packages associated with a population group (g)
86	din	Number of healthcare interventions per package (g,j)
Outputs / projections		
Context		
87	GDP	Assumption of Gross Domestic Product (t)
88	GEX	Assumption of government expenditure (t)
89	LF	Labour force (s,t)
Contributors / insured members		
90	Tactsg	Total active contributors (s,g,t)
91	Tact	Total active contributors in the period (t)
92	act	Active contributors (s,g,x,t)
93	deadactsx	Number of deaths of active contributors (s,g,x,t)
94	_5q	Probability of death in the interval from t-.5 to t (s,g,x,t)
95	Survact	Surviving active contributors from the previous period (s,g,x,t)
96	p	Probability of surviving as an active contributor in the interval t to t+1 (s,g,x,t)
97	nentx	Active contributors that were not active contributors in the previous period (s,g,x,t)
98	_5p5	Probability of surviving as an active contributor in the interval t-.5 to t and x-.5 to x (s,g,x,t)
99	nent	Active contributors that were not active contributors in the previous period (s,g,t)
100	Inssx	Population entitled to healthcare services (s,g,x,t)
101	Insact	Active contributors entitled to receive healthcare services (s,g,x,t)
102	deadInsactsx	Number of deaths of insured active contributors (s,g,x,t)
103	ResIns	Residual insured (s,g,x,t)
104	deadResInssx	Projected death of residual insured (s,g,x,t)
105	Inspensir	Insured pensioners of disability and retirement (s,g,x,t)
106	deadpenirsx	Number of deaths of insured pensioners of disability and retirement (s,g,x,t)
107	Inspenswo	Insured survivor pensioners (s,g,x,t)
108	_5qwo	Probability of death of a survivor pensioners in the interval from t-.5 to t (s,g,x,t)
109	FamIns	Family dependants (s,g,x,t)
110	deadFamInssx	Number of deaths of family dependants (s,g,x,t)
111	deadpenwosx	Survivor pensioners (widows/ers and orphans) (s,g,x,t)
112	Tdeath	Total number of deaths (s,g,t)
Healthcare interventions		
113	UTIL	Total number of health interventions (s,g,j,t,i)
114	UTILx	Total number of health interventions by age (s,g,j,i,x,t)
Salary averages / salary mass		
115	asg	Assumed salary growth (g,t)
116	salt	Average salary of period (t)
117	sal	Average salary (s,g,x,t)
118	Tsal	Theorical average salary (s,g,x,t)
119	cr	Average contribution rate of the active contributing population (t)
120	IN_SALavs	Average insurable salary (s,t)
121	IN_SALav	Average insurable salary (t)
122	RPT_TRE_B	Salary mass (t)
123	RPT_MDAT_B	Salary mass (t)
Insured population and coverage / summaries		
124	RPT_MDAT_C	Employed labour force (s,t)
125	RPT_MDAT_D	Active contributors (s,t)
126	RPT_MDAT_E	Insured active (s,t)
127	RPT_MDAT_F	Insured residual (s,t)
128	RPT_MDAT_G	Insured pensioners (s,t)

129	RPT_MDAT_H	Insured dependents (s,t)
130	RPT_MDAT_I	Insured total (s,t)
131	RPT_MDAT_J	Coverage act/LF (s,t)
132	RPT_MDAT_J_TOTAL	Coverage act/LF (t)
Revenues / summaries		
133	CONTg	Total amount from contributions by population group (g,t)
134	CONT	Total amount from contributions by year (t)
135	RPT_TRE_C	Revenue contributions (t)
136	RPT_TRE_D	Revenues government transfers (t)
137	RPT_TRE_E	Revenues interest revenue (t)
138	RPT_TRE_F	Co-payment (t)
139	RPT_TRE_G	Revenues, other (t)
140	RPT_TRE_H	Revenue, total (t)
Expenditure / S summaries		
141	RPT_TRE_I	Expenditures benefits, healthcare (t)
142	RPT_TRE_J	Expenditures benefits, cash (t)
143	RPT_TRE_K	Expenditures benefits, total (t)
144	RPT_TRE_L	Admin (t)
145	RPT_TRE_M	Other (t)
146	RPT_TRE_N	Total expenditures (t)
Healthcare expenditure		
147	EXP	Annual expenditure through budgetary allocation (g,t,j)
148	EXPsx	Expenditure through capitation (s,g,j,x,t)
149	copay	Total co-payment either a fix amount (s,g,j,x,t)
150	paymentMethodPackage	Payment method, packages (j,pm)
151	BEg	Total financial expenses of benefits (cash and healthcare benefits) (g,t)
152	BE	Total financial expenses of benefits (cash and healthcare benefits) (t)
153	TEXP	Total financial expenses of benefits considering administrative expenses (t)
154	PERFg	Expenses, payments linked to provider performance (g,t)
155	PERF	Expenses, total performance payments (t)
156	BEN_EXP_HEALTH	Total expenditure on healthcare benefits (t)
157	BEN_EXP_HEALTHgt	Total healthcare expenditure by population group (g,t)
Expenditure in cash benefits		
158	valsickallow	Value of benefit for sickness allowances (s,g,x,t)
159	valmatallow	Value of maternity benefits (g,x,t)
160	FEXPsickallow	Financial expenditure on sickness benefits (s,g,t)
161	FEXPmatallow	Financial expenditure on maternity benefits (g,t)
162	FEXPfun	Financial expenditure on funeral benefits (s,g,t)
163	FEXPadfixedb	Financial expenditure on an additional fixed-amount cash benefit (s,g,t)
164	valueadsalb	Value of an additional cash benefit based on salary (s,g,x,t)
165	FEXPadsalb	Financial expenditure on an additional cash benefit based on salary (s,g,t)
166	BEN_EXP_CASHgs	Total expenditure on cash benefits (s,g,t)
167	BEN_EXP_CASHs	Total expenditure on cash benefits (s,t)
168	BEN_EXP_CASH	Total expenditure on cash benefits (t)
Administrative expenditure		
169	AdCostg	Administrative expenditure (g,t)
170	AdCost	Administrative expenditure (t)
Demographic indicators		
171	AC_LFcrs	Labour force coverage rate (s,t)
172	AC_LFcr	Labour force coverage rate (t)
173	IP_NPcrs	Coverage rate of total population (s,t)
174	IP_NPcr	Coverage rate of total population (t)

175	ACaas	Average age of active contributors (s,t)
176	ACaa	Average age of active contributors (t)
177	Tlaas	Average age of total insured (s,t)
178	Tlaa	Average age of total insured (t)
179	NCaas	Average age of new contributors (s,t)
180	NCaa	Average age of new contributors (t)
181	IP04	Age distribution (percentages) of the total insured population 04 (s,t)
182	IP514	Age distribution (percentages) of the total insured population 514 (s,t)
183	IP1549	Age distribution (percentages) of the total insured population 1549 (s,t)
184	IP5064	Age distribution (percentages) of the total insured population 5064 (s,t)
185	IP65plus	Age distribution (percentages) of the total insured population 65+ (s,t)
186	RPT_MDAT_K	Coverage ins/TP (s,t)
187	RPT_MDAT_K_TOTAL	Coverage ins/TP (t)
Financial indicators		
188	A_IN_SALgrs	Annual growth rate of the average insurable wage (s,t)
189	A_IN_SALgr	Annual growth rate of the average insurable wage (t)
190	admin	Administrative expenditure as a proportion of expenditure on health benefits (t)
191	EXPHEALTH_GDPper	Expenditure on health benefits as a percentage of GDP (t)
192	EXPCASH_GDPper	Expenditure on cash benefits as a percentage of GDP (t)
193	EXP_GDPper	Expenditure on total as a percentage of GDP (t)
194	T_EXP_GDPper	Total expenditure (including administrative expenditure) as a percentage of GDP (t)
195	A_TEXPgr	Annual growth rate of total expenditure (including administrative expenditure) (t)
196	RES_RT	Reserve ratio (t)
197	Expx	Average expenditure per person (s,g,j,i,x,t)
198	EXP_PACKj_Ggper	Share of total healthcare expenditure of each health package (g,j,t)
199	HE_EXP_GDPper	Healthcare expenditure as a percentage of GDP (t)
200	SICKA_EXP_GDPper	Sickness benefit expenditure as a percentage of GDP (t)
201	MATA_EXP_GDPper	Maternity benefit expenditure as a percentage of GDP (t)
202	FUNB_EXP_GDPper	Funeral benefit expenditure as percentage of GDP (t)
203	AFB_EXP_GDPper	Additional fixed amount benefit expenditure as a percentage of GDP (t)
204	ASALB_EXP_GDPper	Additional salary-based benefit expenditure as a percentage of GDP (t)
205	HE_EXP_GEXper	Healthcare expenditure as a percentage of government expenditure (t)
206	SICKA_EXP_GEXper	Sickness benefit expenditure as a percentage of GEX (t)
207	MATA_EXP_GEXper	Maternity benefit expenditure as a percentage of GEX (t)
208	FUNB_EXP_GEXper	Funeral benefit expenditure as a percentage of GEX (t)
209	AFB_EXP_GEXper	Additional fixed amount benefit expenditure as a percentage of GEX (t)
Tables / Aggregated financial results		
210	RPT_MDAT	Table main demographic aggregates
211	RPT_TRE	Table revenue and expenditure
212	RPT_TFR	Table financial results
213	CurrentRevenue	Current revenue (t)
214	Expenditure	Expenditure (t)
215	REST	Reserve fund balance (t)
216	RPT_TRE_P_TFR_B	Financial results (t)
217	RPT_TRE_Q_TFR_C	PAYG rate (t)
218	RPT_TRE_R_TFR_D	Beginning of year reserve (t)
219	RPT_TRE_S_TFR_E	Reserve coefficient (t)

Annex 2: Data request for conducting an actuarial valuation for a healthcare scheme

Along with the list of variables in Annex I, this Annex provides the data and information required to conduct an actuarial valuation in a country. All items can be tailored to the specific country context.

The data request is organized in the following sections:

1. Laws, regulations and amendments
2. Financial statements
3. General data
4. Scheme-specific data

1. Laws, regulations and amendments

1.1 For the purposes of the actuarial valuation, the ILO will require the most recent version of the related law and amendments to that Law, as well as corresponding statutes, decrees and regulations.

Moreover, the ILO will require:

1.2 A copy of every draft law, if any, that is currently under review.

1.3 A summary of social security provisions.

1.4 A copy of any previous actuarial valuations performed.

1.5 Any other documentation that details the scheme or previous valuations, or that may otherwise be considered relevant.

2. Financial statements

2.1 Annual reports and (audited) financial statements for each of the past 10 years.

2.2 If the benefit expenditure and contribution income are disaggregated in the (audited) financial statements according to type of expenditure/income, the ILO would require additional details on the following expenditure/income items:

- **Expenditure**
    - Expenditure on healthcare services by healthcare package: Promotive services, preventive services, curative services, diagnostic and rehabilitative services, ambulance service and other services as prescribed. If the [Health Institution Name] uses a different classification

of the interventions included in the benefit package, users should provide the information using that alternate classification.

- Administrative expenditure by government level (federal, province/region/state and local) and by main function (enrolment, collection of contributions, claims processing, others).
- Other expenditure categories (if any).

- **Revenues from contributions and other Income**
  - Contributions from mandatory members separate from employers and from employees;
  - Contributions from voluntarily enrolled members;
  - Government transfers/subsidies (breakdown of transfers for specific groups, if applicable);
  - Revenue from financial investments;
  - Transfers from other national organizations and international governments, entities or individuals; and
  - Other income (if any).

3. General data

3.1 General demographic data

Demographic data	Details
- National population data	- Population by age and sex. Historical series for the past 20 years and official projections for the next 20 years.
- Historical information on total fertility rates (20 years)	- Total fertility rates and fertility rates by age
- Historical information on migration rates (20 years)	- Net migration rates by age and sex
- Historical information on mortality rates and life expectancy (20 years)	- Mortality rates by age and sex (infant mortality rates, under-5 mortality rates and mortality rates for the other age groups) - Life expectancy by sex

3.2 Labour force and general economic data

Labour force and general economic data	Details
- Historical and projected information on labour force	- Labour force and employed population by status in employment (employees, employers and self-employed workers, by age and sex- past 10 years and projected for the next 20 years)

- Labour force participation rates	- Labour force participation rates by age and sex (past 10 years and projected for the next 20 years)
- Historical information for self-employed workers	- Population of self-employed workers by age and sex
- Historical information on wages or income	- Average wage or average income by sex - Wage growth rate (real and nominal) - Wage share of GDP
- Historical information on inflation rates (10 years)	- Inflation rates: (CPI and GDP deflator rates by year)
- Historical information on GDP (10 years)	- Nominal GDP by year - Real GPD by year - Real GDP growth rate by year
- Historical information on market interest rate (10 years)	- Interest rate by year (lending rate or bank rate that usually meets the short- and medium-term financing needs of the private sector)

3.3 Healthcare infrastructure and human resources data

Healthcare infrastructure and human resources	Details
- Healthcare infrastructure	- A detailed list of infrastructure available for the healthcare system and specific for the scheme, including third-party providers (if necessary). - A list of healthcare infrastructure by level of care (primary, secondary, tertiary) and type (public / private) in the country.
- Healthcare providers	- The total number of healthcare providers by status in employment. - The total number of healthcare and non-healthcare staff of the facilities of the social health insurance system or scheme and that are specific to the scheme.

4. Scheme-specific data

4.1. Covered population (active contributors and insured)

Covered population	Details
- Coverage rates of the labour force (10 years)	- Active contributors as a percentage of the labour force, by population group and sex
- Information on active contributors (10 years)*	- Number of active contributors, by population group, sex and age
- Information on insured active contributors (10 years)*	- Number of insured active contributors, by population group and sex

- Information on family dependants of active contributors (10 years)*	- Historical number of family dependants, by population group covered, sex and age

*Note: For non-contributory / fully-subsidized schemes, the listed information for all registered members is required (disaggregated by the principal insured and family dependants if this distinction exists in the scheme).

4.2. Expenditure and revenue

Expenditure (historical)	Details
- Expenditure on healthcare benefits	- Expenditure on healthcare benefits by population group by healthcare package, payment method and sex (10 years)
- Expenditure on cash benefits fore maternity and sickness	- Expenditure on cash benefits for maternity and sickness by population group and sex (10 years)
- Administrative expenses	- Administrative expenses (10 years)
- Expenditure on other cash benefits	- Expenditure on other cash benefits by population group and sex (10 years)
- Average cash benefits	- Average cash benefit by category (maternity, sickness and others) by population group and sex (10 years)

Revenue (historical)	Details
- Contributory salary/income*	- Average contributory salary or income by sex (10 years) If the scheme applies a standard lump sum amount for contributions (i.e., not based on salary or income), users should provide the amount
- Total revenue	- Total revenue by population group (10 years)
- Revenue from social contributions	- Contribution revenue from employers (10 years) - Contribution revenue from wage workers (10 years) - Contribution revenue from other groups (10 years) such as self-employed workers, voluntary registered members, etc.
- Revenue from investments (10 years)	- Nominal rate of return on investments of the reserve fund of the social security scheme by type of financial instrument - Real rate of return on investments of the reserve fund of the social security scheme, by type of instrument - Revenue from investment of the reserve fund by type of financial instrument
- Government transfers/taxes	- Revenue from government transfers (10 years)

- Balance sheet on contributions	- Balance sheet on contributions and expenditures: revenue less expenditures on contributions (10 years)
- Balance sheet total	- Total balance sheet: total revenue minus total expenditure (10 years)
- Reserve fund (if any)	- Reserve fund (10 years)

*Note: This information is needed even for schemes that receive government subsidies for individual income-based contributions.

4.3. Data on members and claims

The following data on members and claims are required to carry out the actuarial valuation:

Employers (if applicable):

- Unique ID number
- Sector (according to internal classification – public, private, etc.)

Contributions:

- Month
- Year
- ID of contributor
- ID of employer
- Salary / income amount
- Contribution amount
- Government transfer amount (if applicable)

Contributors:

- ID of contributor
- Sex
- Birthdate

Insured / dependants:

- ID of insured / dependant (if applicable)
- Relationship with main contributor (if available)

- ID of main contributor
- Birthdate
- Sex
- Type of scheme affiliation (for example contributory, subsidized, non-contributory)

Claims:

- Claim number
- Claim amount
- Type of claim / intervention identifier
- ID of the insured person (beneficiary)
- Type of provider / provider ID, if applicable
- Date of claim
- Intervention date
- Number of days of hospitalization (if applicable)
- Co-payment (if applicable)

References

ILO Social Security Conventions and Recommendations

R069 – Medical Care Recommendation, 1944 (No. 69)

C102 – Social Security (Minimum Standards) Convention, 1952 (No. 102)

C130 – Medical Care and Sickness Benefits Convention, 1969 (No. 130)

C183 – Maternity Protection Convention, 2000, (No. 183)

R191 – Maternity Protection Recommendation, 2000 (No. 191)

R202 – Social Protection Floors Recommendation, 2012 (No. 202)

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