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Global Demography Expert Survey on the Drivers and Consequences of Demographic Change

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Abstract

Insight into the future of the world population is key for policy planning. At present, several organisations engage in developing global long-term population projections and provide varied results in terms of projected population size and structures. This diversity demonstrates that there is a need to reflect on the ingredients that feed into the projections. For this reason, the JRC, IIASA and the UN Population Division launched a survey where experts were asked to assess the validity and relevance of alternative arguments about the forces that could shape future fertility, mortality, and migration trends in the country of their choice. The results of the survey highlight that experts almost unanimously support the roles played by urbanisation, reductions in child mortality, greater educational attainment, and employment opportunities for women in decreasing fertility in high fertility countries. At the same time, life expectancy is expected to continue increasing across world regions, with the most significant improvements projected by experts in current 'low mortality' countries. Experts on migration mostly agree that climate change will lead to a rise in immigration. However, there is less agreement on the forces driving emigration. As a broad conclusion, the expert opinions seem to indicate that demographic challenges of the future do not necessarily have demographic solutions, and will instead necessitate improved adaptive capacities among all societies.

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This is joint work between the Joint Research Centre, the International Institute for Applied Systems Analysis (IIASA), the Vienna Institute of Demography (VID/OEAW) and the United Nations Population Division in the Department of Economic and Social Affairs.

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Executive summary

Population projections provide a valuable toolbox for thinking about the implications of upcoming trends and shifts in population size and structure, which are crucial for understanding various global economic, environmental, societal, and geopolitical developments that significantly depend on human actions. As a result, gaining insights into the future of the global population, in terms of both size and composition, is essential for strategic policy formulation.

Most national statistical offices regularly develop population projections. Additionally, some organizations implement population projections at the global level, employing a wide range of methods. In one way or another, these projections rely on expert opinions to come up with assumptions concerning future fertility, mortality, and migration, following various scenarios. These projections are used by different stakeholders, but it is often unclear what assumptions were made and how they were constructed. That is why IIASA and the United Nations Population Division, two of the world's leading producers of population projections, have joined forces with the JRC to conduct a study on what experts think about the determinants and drivers of future population growth, by creating a survey addressed to them.

In this report, we document the results of the online survey that was conducted in 2023. A total of 237 respondents, primarily members of the main demographic associations shared their opinions on 240 arguments/statements related to future trends and drivers of fertility, mortality, immigration, and emigration, as well as on the policy consequences of key demographic megatrends. They also provided numerical estimates of future fertility and life expectancy levels in 2050 and 2100, with 80% confidence intervals. It is worth noting that the participation and geographical coverage of the respondents do not allow this survey to be considered representative for country specific analysis. Nevertheless, it does offer valuable insights into the demographic challenges of the future, their drivers, uncertainties, and potential consequences.

Survey respondents overwhelmingly express agreement about various factors contributing to decreased fertility in high fertility countries, including urbanization, reduced child mortality, increased educational and employment opportunities for women, delayed age at first marriage, greater acceptance of modern contraception, and shifts in family ideals. It is expected that current high fertility countries will continue to experience a decline in the number of births per woman. However, this decline is anticipated to be at a slower pace compared to the projections made by leading demographic institutions.

Many experts report that evidenced factors contributing to further declines in fertility in low fertility countries include choices for delayed parenthood, increased social acceptance of childlessness, economic uncertainty, and rising housing costs. Conversely, most experts consider that government policies such as universal access to childcare and child subsidies could help people realize their choices and have larger families. There is also some recognition, although to a lesser extent, of the role of advancing reproductive technology and more flexible work practices in increasing fertility.

Experts anticipate that fertility levels will remain low or very low. Their projections even suggest that actual fertility levels may be lower than those projected by model-based population projections.

Life expectancy is expected to rise across world regions throughout the century. Experts project the most significant improvements in current low mortality countries. These advancements will be facilitated by future medical breakthroughs and the continued adoption of health-conscious behaviors. In low mortality countries, the most debated issues concern the persistence of lifespan disparities among sub-populations, the resilience of healthcare systems, and the potential impacts of climate change. In high mortality countries, there was the greatest disparity in opinions regarding economic challenges and access to medical services that could hamper an increase in lifespan.

Experts in the field of international migration generally concur on climate change leading to an increase in immigration, but there is less consensus regarding the impact of climate change on emigration. The discrepancy may be linked to the geographic origins of the respondents, with the majority residing in Europe or North America. Factors such as aging populations, labour force shortages, economic developments, and migration schemes are widely acknowledged as major drivers of both immigration and emigration.

The majority of respondents anticipate significant increases in emigration rates for Africa, Asia, Latin America, and the Caribbean. Conversely, substantial growth in immigration rates is expected, primarily in Europe.

When exploring the policy consequences of key demographic megatrends, demographers' viewpoints can be broadly categorized into two 'perspectives' concerning the role of population policies, especially in relation to fertility. One group, without challenging the human rights-centered approach, advocate for a more prominent role for population policies and family planning. Some others place their trust in the autonomous forces of development and education, believing that these factors can autonomously lead to a reduction in fertility rates.

Opinions on the significance of various issues and the role of policies can sometimes vary, depending on whether a low or high fertility context is being considered. The divergence implies that achieving international consensus on population policies has become a more intricate task, requiring a delicate balance of various priorities, perspectives, and objectives.

Those who express greater concerns about the adverse consequences of population growth on the environment and development often advocate for more interventions. Conversely, a more moderate position is taken by those who attribute emissions to income levels and emphasize the inevitability of demographic inertia.

In conclusion, experts' opinions suggest that the demographic challenges of the future may not always have straightforward demographic solutions. Instead, addressing these challenges is likely to require an emphasis on enhancing the adaptive capacities of societies. This need is pronounced in the case of low fertility and ageing societies, but it is also in high fertility and high mortality countries where the imperative to bolster adaptability and resilience is even greater. It highlights the importance of not only considering traditional demographic policies but also fostering adaptability and resilience to navigate the complexities of evolving demographic trends.

Introduction

Anticipating future population change is important to estimate most global economic, environmental, social, and geopolitical trends and trajectories that substantially depend on human activities. Therefore, knowing about the future of the world population is key for policy planning (Kaneda and Bremner, 2014).

At present, several organizations engage in developing global long-term population projections, following different methodologies and assumptions, which lead logically to varied results in terms of projected population size and structure. The United Nations Population Division in the Department of Economic and Social Affairs has been the main provider of global population estimates and projections at regular intervals since 1951[1] following several modelling methodologies (deterministic, probabilistic, Bayesian), but not using expert judgement about the trend and uncertainty of future fertility, mortality and migration. Their latest estimates and projections to 2100 were published in 2022 (UNDESA 2022). In recent years, two newcomers have entered the field of global population projections[2]: the Wittgenstein Centre for Demography and Global Human Capital since 2013 with projections that include the level of educational attainment of the population and in which population is forecasted using model- and expert-based assumptions (Lutz et al. 2014, Lutz et al. 2018 in collaboration with the European Commission Joint Research Centre, KC et al. 2023); and more recently the Institute for Health Metrics and Evaluation (Vollset et al. 2020) with projections that are mostly model-based. While this diversity is a demonstration of, on the one hand, uncertainties surrounding the long-term future and, on the other hand, of the scientific wealth existing in the field of population projections, there is a need to reflect on the ingredients that feed into the projections. It is particularly important from the perspective of users, both those who will employ them to derive policy decisions and those who will utilize the projection output in terms of population for their own modelling exercise.

In one way or another, most global projections are based on expert opinions. These opinions may relate to the future trajectory, the target level, or the composition of the determinants of population growth. This is particularly the case for projections produced by national statistical agencies. Expert knowledge has also been used for research-project-related population projections. Just to cite a few examples, within the Uncertain Population of Europe (UPE) project, Alders, Keilman, and Cruijsen (2007) used expert views to derive future expected levels of fertility, mortality, and international migration by 2050, as well as to assess the uncertainty around these levels to derive probabilistic population projections for 18 European countries. A similar approach was followed by Lutz, Sanderson, and Scherbov (1998) at the level of 13 world regions. Both these exercises involve a limited number of experts.

In 2010-2011, the International Institute for Applied Systems Analysis (IIASA), the Vienna Institute of Demography (VID/OEAW) in collaboration with Oxford University initiated a global internet survey on the likely future trends in fertility, mortality, and migration (with 80 percent uncertainty intervals), and the drivers of the changes. For the latter, the experts were asked to assess the validity and relevance of alternative arguments about the forces that could shape future fertility, mortality, and migration trends in the country of their choice. The arguments were clustered by themes, e.g., the argument "Smoking prevalence will decline" belonged to the cluster "Health-related behaviour". The results of the survey (argument assessment and numerical values) were used in two ways. Firstly, they fed into several meetings of meta-experts[3] who developed multiple scenarios for future mortality and fertility trends in high- and low-settings, and migration trends. Secondly, the numerical values (both from experts and meta-experts) were combined with model-based assumptions to develop the assumptions that sustained the Wittgenstein Centre[4] (WIC) projections (Lutz, Butz and KC 2014 and further global projections).

The 2023 survey presented here follows in the step of the WIC survey above which was taken as a basis for developing the arguments (presented in Table 1 in the Annex), although it differs in four main ways. Firstly, the arguments were revised to reflect some of the trends that have become more salient since 2010-2011, namely climate change and its impact on the population (heat waves, disasters, etc.), the spread of infectious diseases (Ebola, COVID-19, etc.), the intensification of conflicts (Syrian civil war, invasion of Ukraine, war in Afghanistan, etc.), as well as faster than expected progress in reducing child mortality. Secondly, the procedure to elicit opinions from the experts was simplified by only asking for agreement to a particular argument instead of the

[1] https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf

[2] A few other institutions produce global population projections at regular interval such as the Population Reference Bureau provide global projections for 2035 and 2050 (last update: PRB 2022) and the US Census Bureau until 2060 for all countries (and until 2100 for all countries except the USA)(last update: US Census Bureau 2023).

[3] The meta-experts were individuals selected based on their substantive insight and experience in their respective field.

[4] The Wittgenstein Centre for Demography and Global Human Capital is a collaboration among the Austrian Academy of Sciences (ÖAW), the International Institute for Applied Systems Analysis (IIASA) and the University of Vienna. It was established in 2013.

validity and relevance of the argument. Thirdly, the migration module covers separately immigration and emigration that were previously merged together. Fourthly and last, the survey includes a section on the potential consequences of demographic change for policy. The survey was initiated by the European Commission Joint Research Centre in close collaboration with IIASA and the United Nations Population Division and with the support of a steering group (list of members in Table 6 in the Annex).

This type of exercise is particularly useful because it allows for the development of future scenarios and provides users with alternative population trajectories, which depend on different policies implemented. Among the climate change community, for instance, expert- and scenario-based population projections have been used to forecast future mitigation and adaptation challenges. With the endorsement of the Sustainable Development Goals and the Paris Agreement coupled with rapid changes in the environmental, social, political, and economic systems and the pandemic, it is essential to examine how these trends could directly and indirectly affect population trends, and, how population levels and trends affect sustainable development. The findings of the survey will play a crucial role in the dialogue between policy makers and demographers.

The report is structured in five main chapters. In the first chapter, we present in detail the methodology used to design the survey and its structure. Then in the following three chapters, we outline the results of the survey on fertility (chapter 2), mortality (chapter 3), and migration (chapter 4). Chapter 5 highlights the main findings related to the segment of the survey on the implications of demographic change and the role of policies.

1. Chapter 1: Methodology and Structure of the Survey

As mentioned in the introduction, the survey has its origin in an earlier survey developed in 2010-2011 at the Wittgenstein Centre, which has now been updated to provide more actual information on the opinion of demographic experts on the future. The methodology to elicit expert opinions has also been modified as detailed in this chapter.

This chapter begins with an introduction to the survey design, followed by a description of its structure and the division of countries into high or low fertility and mortality settings. We then present the qualitative statements on fertility, mortality, migration and consequences of demographic change developed for the survey, which are also detailed in Table 1 in the Annex. In Section 1.3, we present the characteristics of the respondents. The final part walks the reader through the limitations of the survey and reflects on the feedback received by the respondents.

1.1. Survey design

In June 2023 members of the main international population associations (APA – Asian Population Association, EAPS – European Association for Population Studies, IUSSP - International Union for the Scientific Study of Population. PAA - Population Association of America, UAPS – Union for African Population Studies) were invited to participate in the online survey. The survey was open for respondents to submit their answers for six weeks. The survey was internet-based, and the link was shared via email by the international population associations directly through their member mailing lists. The decision to reach demographers through population associations offers the advantages of enabling a coverage of experts worldwide, and with a mixed professional background. In addition, the survey was advertised on several platforms, such as social media and news items on institution websites (IIASA, JRC). The announcement did not provide a direct link to the survey; however, it offered the option to send an email requesting the link to join and participate. This was especially thought for the second module of the survey (see below) that looked at the consequences and policy implications of demographic change and that could be of interest to a broader audience than just population experts.

The survey was composed of two modules: Module 1 focused on the drivers of demographic change related to the fields of fertility, mortality or migration, whereas Module 2 focused on the consequences of demographic change.

In a first step, respondents were asked to select a country or region of expertise[5]. They were then asked to choose which section they wanted to reply to (see Figure 1). In Module 1 the experts could choose among fertility, mortality and migration, with the possibility to answer one, two or all of them. Module 2 on consequences of demographic change was common to all experts. In a second step, for their self-selected country/region of expertise, respondents were presented with a dashboard showing the past trends (from the UNDESA 2022) for the period 1950-2020 and future projection assumptions as published by the three main producers of global population projections (IIASA/WIC, UN, and IHME) and asked to provide point projected assumptions for total fertility rate[6] and life expectancy at birth[7] (separately for men and women), respectively, and the related 80 per cent confidence interval (CI – lower bound and upper bound) for 2050 and 2100. Given the difficulty in estimating a value or a rate for future migration flows, the migration module respondents were asked to estimate whether emigration or immigration rates would increase or decrease following several developments.

Respondents were then asked to assess the validity of a set of qualitative statements referring to expected drivers of changes in fertility, mortality and migration. For the fertility and mortality modules, we split the countries and regions in two groups corresponding to low and high fertility and mortality countries for which the statements differ (see Table 5 in the Annex for the categorization of countries). The methodology and thresholds used to split the countries are described below. In order to check whether reflecting on the drivers of change had any impact on the experts 'assumptions about the future of the total fertility rate, life expectancy

[5] Experts could fill the survey for several countries/regions. In total, we have received answers from 237 respondents covering 71 regions/countries.

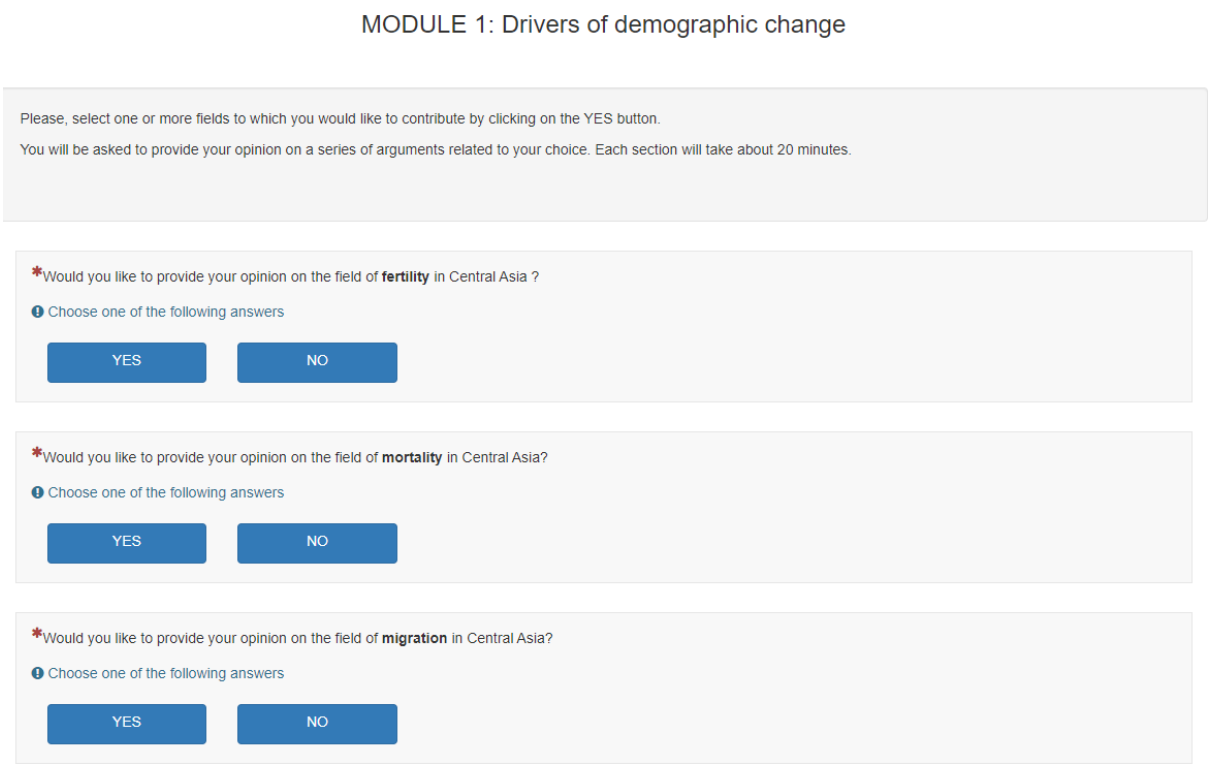
[6] The total fertility rate (TFR) is a statistical measure representing the average number of children a woman is expected to have over her lifetime assuming that current fertility patterns remain stable throughout her reproductive life.

[7] Life expectancy at birth is a statistical measure that represents the average number of years a person is expected to live, assuming that current mortality rates remain relatively stable throughout the person entire lifetime.

and migration flows in 2050 and 2100, respondents were given the opportunity to alter their numerical estimates, as well as their judgement on the direction of migration rates, following a semi-Delphi technique[8].

Respondents who wished to skip Module 1, were directed to Module 2 which included a list of statements on the consequences of demographic change. At the end of each section, they were offered the possibility to provide comments on individual sections or on the whole questionnaire. The last section of the survey included a set of questions to collect voluntary data regarding respondent's age, gender, country of birth and of residence, and affiliation of work. The completion time of the survey with the choice of one section was estimated at about 20 to 30 minutes.

Figure 1. Choice of fields as displayed in the online survey



Source: Global Demographic Expert Survey, questionnaire

As outlined in the Introduction, the qualitative statements for the 2010-2011 version of the survey were designed by a team at IIASA and the Vienna Institute of Demography. The questionnaire was first developed only with respect to mortality and was then further operationalized to systematically collect assessments on fertility, mortality and migration (Lutz et al. 2011). In the current version of the survey the arguments remained largely similar apart from some necessary updates.

These arguments took the form of a statement on future trends that might affect population dynamics. The statements were formulated in a way which explicitly refers to their likely consequence on fertility, mortality, or migration. For instance, one argument reads: 'Men and women will increasingly share the burden of housework and childcare. This will likely increase fertility'.

For each of the arguments the experts were asked their degree of agreement on the statement and on the likelihood of increasing or decreasing fertility, mortality or migration in the future (response options: 'I strongly agree', 'I agree', 'Neutral', 'I disagree', 'I strongly disagree'). A set of statements on the consequences of demographic change was also included in the survey and was part of Module 2. In this module, respondents could choose among three answer options ('I agree', 'Neutral', 'I disagree').

In Module 1 the qualitative statements were clustered in forces, as shown below.

[8] The Delphi survey technique is a qualitative research method that is used to gather and distill the opinions and judgments of a group of experts on a particular topic. It is typically conducted in several rounds, and it aims to achieve a consensus or convergence of expert opinions on the topic being studied. In this case, there is one iteration on an individual basis in which the expert has the possibility to revise his/her opinion after assessing several arguments.

Major forces shaping fertility in low fertility countries:

1. Changing cultural and social forces in fertility ideals, norms and desires
2. Changing patterns of partnerships and gender differences
3. Role of policies
4. Employment and economy
5. Biomedical and the timing of parenthood
6. Education

Major forces shaping fertility in medium-high fertility countries:

1. Cultural change in ideal family size
2. Health and child survival
3. Status of women in family and society
4. Economic costs and benefits
5. Reproductive health

Major forces shaping life expectancy in high mortality countries:

1. Changes in biomedical technology
2. Effectiveness of health care systems
3. Behavioural changes related to health
4. Infectious diseases
5. Environmental change, hazards and wars

Major forces shaping life expectancy in low mortality countries:

1. Changes in biomedical technology
2. Effectiveness of health care systems
3. Behavioural changes related to health
4. Possible new infectious diseases and resurgence of old diseases
5. Environmental change, hazards and wars

Major forces influencing international immigration and emigration:

1. Economic development
2. Climate change
3. Demographic factors
4. Migration regimes and policy

Consequences of demographic change

1.2. Selection of countries into the 'low/high fertility' and 'low/high mortality' modules

Four sets of arguments pertaining to fertility and mortality were formulated: one for settings with low fertility levels, and another for those with for high fertility levels. As well, two more sets of arguments were developed for settings with low mortality and high mortality levels. The categorization of countries or regions based on their level of fertility or mortality levels adhered to the following criteria, based on the same rationale as the 2010-2011 survey. Regarding fertility, countries or regions were ranked based on the total fertility rates estimated for the period of 2019 by the United Nations (UNDESA) World Population Prospects and the UN Human Development Index (HDI) for 2021 (UNDP 2022). The reason to also use the HDI to distinguish countries between high and low fertility was to also take into consideration cases where fertility and mortality levels do

not necessarily reflect the socioeconomic development of the society. This was primarily linked to the need to formulate arguments which could describe future fertility trends, and that are specific to particular settings and sets of challenges, e.g., reproductive health in high fertility settings. The group of countries with low fertility includes:

- Countries with sub-replacement period fertility (total fertility rate (TFR) <2.10) and moderate or high level of development (HDI at =0.650 or higher).
- Countries with moderate period fertility (TFR between 2.10 and 2.49) and a higher level of development (HDI at =0.670 or higher).
- Countries with moderate period fertility (TFR between 2.10 and 2.49) and unknown level of the HDI (which has not been computed for them).
- Countries with higher period fertility (TFR at =2.50 or higher) and with very high level of development (HDI >0.85). Only one country, Israel, was included on this basis.

The group of countries with high fertility includes:

- All countries with a TFR at 2.50 or higher
- Countries with a TFR between 2.10 and 2.49 and HDI <0.670
- Countries with a TFR <2.10 with low HDI values (<0.65)

With regard to mortality, the distinction between high and low mortality countries was done according to the level of child mortality, calculated as the probability of death before the age of five (expressed as per 1,000 live births). Countries showing more than 25 deaths before age 5 per thousand live births were categorized as a high mortality country. This is in accordance with the practice of the World Health Organization (WHO) and United Nations Children's Fund (UNICEF). Table 4 in the Annex includes all the countries/regions among which respondents could choose from.

1.3. Respondents and countries

In Module 1 questions were optional, allowing respondents the choice to skip them, while responding to the questions was mandatory in Module 2. The survey was completed by 237 experts who provided answers for 54 countries and 17 regions. Annex Table 3 gives a breakdown of the respondents' profiles that were derived from questions at the end of the survey. Although a number of respondents did not provide any information about themselves (about 25%), those who did are in majority affiliated with an academic institution (102), followed by those affiliated with a research institution (37). The largest share of respondents are males (107), and are residents of the United States (33) followed by residents of Austria (12). The largest share declared to be born in the United States (22) followed by Italy (11). In contrast to the 2010-2011 survey where respondents could choose among countries only, the current version allows respondents to choose among countries or regions according to their expertise. Table 4 in the Annex shows the distribution of countries and regions chosen by the experts. Western Europe as a region was the most popular choice (28 assessments), followed by Western Africa (12 assessments) and Northern America (11 assessments). The names and composition of geographical areas follow the United Nations 'Standard country or area codes for statistical use' (ST/ESA/STAT/SER.M/49/Rev.3)[9].

Although it was possible to reply to either module of the survey, 76 respondents replied to the questions across all modules and fields available (Module 1: fertility, mortality, migration; Module 2: consequences of demographic change). Although the survey's participant pool and geographic coverage do not allow this survey to be considered representative for country specific analysis, it still provides valuable insights into the forthcoming demographic challenges, their underlying factors, uncertainties, and potential ramifications.

1.4. Quantitative estimates

In the survey, respondents were asked to provide quantitative estimates for the total fertility rate and life expectancy at birth, respectively, and the related 80 per cent uncertainty interval for the years 2050 and 2100. The reason why these point estimates were asked for was to quantify respondents' expectations that could be compared with existing projections as produced by IIASA, IHME, and the UN. After assessing the validity of the qualitative statements on fertility or mortality, experts were given the opportunity to insert again a quantitative

[9] Classification available at: http://unstats.un.org/unsd/methods/m49/m49.htm

estimate which could be different from the one inserted before reflecting on the statements. Estimates were, therefore, asked twice within the survey.

Instead of asking for a numerical estimate, in the migration section respondents were asked to only assess whether emigration or immigration rates will increase or decrease. The choice is motivated by the challenges of accurately assessing and measuring migration, which is highly erratic and difficult for experts to quantify compared to fertility and mortality. Measures of net migration, namely the level of immigration minus emigration of people who intend to migrate for at least one year, are commonly used in migration reports provided by many data centres (Rienski and Strate, 2012). However, it has been widely criticized for not accurately reflecting other relevant data about migration. In fact, there is no actual demographic process of net migration, only immigration flows into a country and emigration flows out (Lutz et al. 2014, Rees et al. 2000, Wilson and Rees, 2021). For this reason, in the survey respondents were asked about expected future development of immigration and emigration rates, and not net migration estimates.

1.5. Feedback and limitations

At the end of each module of the survey, we included a space for respondents to provide comments. This was used by a several respondents, who left feedback that we used to evaluate the survey. We received some general positive comments about the overall initiative, and on specific sections of the survey. Many of the critical comments concerned it is the length of the survey, as many respondents indicated it included too many questions. In addition, respondents also indicated that some of the questions were too difficult to answer, with a number of recurrent themes. In detail, numerous respondents expressed concern about the explicit indication of a direction in the statement of the impact of each argument on future trends in fertility, mortality or migration. They reported that it was confusing and difficult to choose which part of the argument they had to reply to, as they may have agreed with the qualitative statement but not with its effect on one of the assessed demographic fields. Some respondents referred to those questions as double-barreled, namely when respondents are asked for feedback on two different issues or topics within one question. Since individuals could only respond with a single answer, respondents raised the concern that the phrasing of such questions could lead to skewed results. Although we understand the comment raised by some respondents, our decision about the phrasing of the arguments was driven by the need to shorten and simplify them compared to the 2010-2011 version of the survey. While in the 2010-2011 version of the survey respondents were asked to judge the validity and the relevance of each argument separately, in the current version arguments were not divided in two with the aim to make the survey more accessible and easier to respond to. Also, in the formulation of the statement, we tried to point at a partial effect, e.g., contributing to lower fertility rather than at a definite one (for example, one of the statements in the fertility module reads: *Voluntary childlessness has spread and is increasingly becoming socially accepted, and it is likely to contribute to lower fertility in the country/region*).

The length and complexity of surveys may have led participants to dropout. This is because lengthy and complex surveys tend to overwhelm respondents, leading to disengagement and incomplete responses. Although we have attempted to simplify and reduce the number of statements compared to the 2010-2011 version of the survey, we acknowledge that it is still quite lengthy. To understand whether and how this has affected respondents, we have calculated the dropout rate of our survey. For each module, we have computed how many respondents replied to the questions included and we have produced a table indicating the share of responses replied within the survey and how it affected response rates. Table 2 in the Annex shows the sensitivity analysis of dropout rates, namely how response rates decrease when using different thresholds of completion (20%, 30%, 40%, 50%). For the analysis of survey results, we have chosen to restrict our sample to those respondents who have completed at least 50% of questions within each module, as this was deemed to lead to more robust results.

It is clear that the sample of respondents suffer from several biases, that are inherent to most surveys. The survey does not pretend to represent the population of experts in demography. As well in terms of coverage, certain countries and regions are underrepresented, particularly in the global south.

Another limitation of the survey is linked to its respondents, namely experts in demography. Expert-opinion studies have well-known shortcomings. One of them is related to the widely observed tendency of experts to provide conservative or inaccurate opinions (Booth, 2006). Expert opinions tend to be based on strong beliefs or intuitions that can result in biases (Lutz et al. 1999). Overall, given the limitations, it is important to interpret the survey results with caution. Nevertheless, this approach was used as we believe expert opinions are valuable in embedding knowledge on trends that are assumed to have an effect on population dynamics and are often not considered. In addition, they allow gaining a better understanding on drivers of population changes.

2. Chapter 2: Fertility

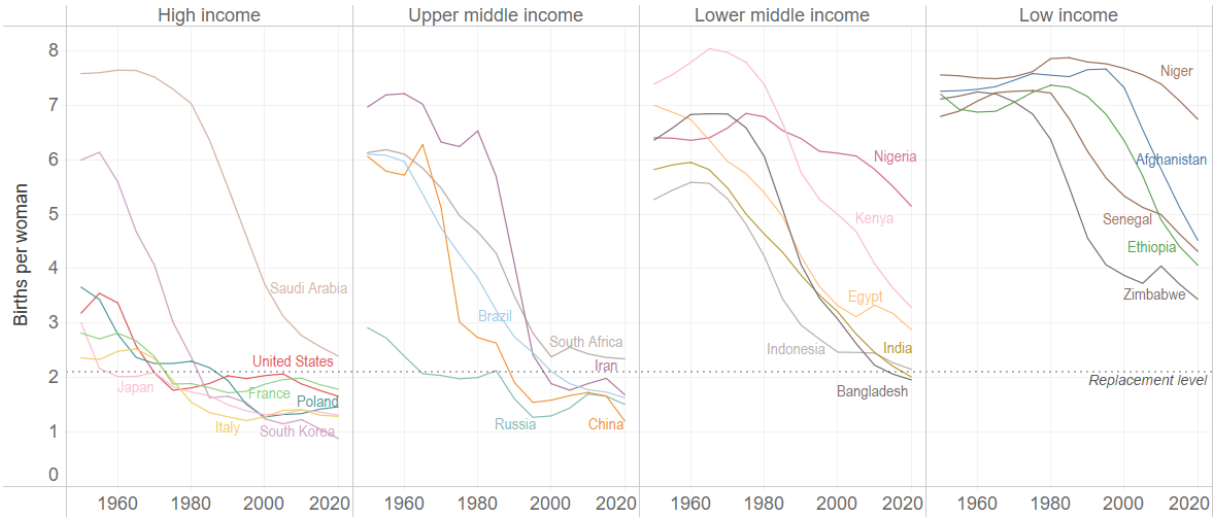
2.1. Key messages

- The fertility module covered a broad range of arguments about the drivers of fertility and the influence on future trends. There is common agreement among demographic experts on what is driving the future course of fertility, but variations exist between arguments concerning high and low fertility countries.
- Experts widely concur on the drivers of fertility in high fertility countries, as explained by the demographic transition theory, which describes the process of birth rates declining from high levels to low levels as societies undergo social and economic development.
- The role of urbanisation, reductions in child mortality, greater educational and employment opportunities for women, older age at first marriage, broader acceptance of modern contraception, and change in family ideals in decreasing fertility is almost unanimously supported by survey respondents.
- Experts are more divided over the drivers of future fertility in countries that have completed their demographic transition and now experience low levels of fertility.
- Factors for a further decline in fertility levels in low fertility countries are widely seen in delayed parenthood, the social acceptance of childlessness, economic uncertainty, as well as housing costs.
- Factors potentially increasing fertility levels in low fertility countries are seen by the majority of experts in government policies such as the provision of universal access to childcare and child subsidies and to a lesser degree in greater availability and advancement of technology assisting reproduction and more flexible work practices.
- According to expert-based projections, the number of births per women in current high fertility countries will continue to decline, yet they anticipate a slower pace of the fertility transition compared to the results of demographic projection models of leading demographic institutions.
- For low fertility countries, experts project that fertility levels will remain at low or very low levels between about 1 and 2 birth per woman. They anticipate lower levels of fertility than what is projected in model-based population projections.

2.2. Background

All countries in the world have now at least begun the process of the demographic transition during which fertility declines from high to low levels. While this transition is unlikely be completed in many countries before the second half of this century, particularly in sub-Saharan African region, the list of countries that have entered the post-transition phase with fertility remaining at low levels continues to grow. It is no longer limited to high-income countries. In many middle-income countries the average number of births per woman has declined below 2.1, the level of fertility generally considered necessary to maintain population size over long-term. Countries such as Brazil, China, Iran and Turkey have already seen low fertility rates for multiple decades while countries such as India and Bangladesh are currently seeing the average number of births per women dropping below replacement level (Figure 2). Including these two countries, more than two-thirds of the world's population lived in countries with low levels of fertility in 2022.

Figure 2. Global fertility trends 1950 to 2022 by World Bank income group, selected countries based on population size, geographic region, and level of fertility



Source: Own elaboration based on UNDESA (2022)

The survey questionnaire included separate modules with questions on fertility for countries where fertility is at low levels (126 countries) and for countries where fertility is at higher levels (94 countries, detailed list in Table 5 in the Annex) as explained in Chapter 1.

Different sets of questions for high and low fertility countries were included to synthesise the different social, economic, cultural and individual factors that have been put forward in demographic research on fertility. The demographic transition theory has been dominant in explaining the transition from high levels of fertility to low levels of fertility in countries as they develop and modernize (Kirk 1996). Factors are broadly linked to economic development, urbanisation, cultural shifts in ideal family size, advances in health and education, access to contraception, and changes in the status of women in family and society. Lower use of effective methods of contraception among women who say they want to delay or avoid pregnancy limits their capacity and that of couples to realize their fertility intentions..

A widely used concept to explain persistent low fertility in countries that have gone through the demographic transition is the Second Demographic Transition Theory (Lesthaeghe 1995, 2010, 2020; van de Kaa 1987). The theory focuses on social and cultural changes in post-industrial societies and puts emphasis on changes in family structures, relationships and values. Factors include changed attitudes towards family and childbearing, reduction in marriage, later timing of childbearing, gender equality and changed gender roles, and diversification of family-file trajectories. It is generally assumed that many people in low fertility countries aspire to have more children than they end up having due societal and economic dysfunction, gender inequality, incompatible work and family life, work-oriented culture or inadequate social support (Gietel-Basten et al 2022). As mentioned, the questionnaire is an updated version of a similar survey carried out by IIASA in 2010-2011 (for a detailed discussion of fertility theory see Chapters 3 and 4 in Lutz et al 2014).

Each question was formulated as a statement related to a factor influencing the future course of fertility as either contributing to an increase or a decrease in fertility levels. The demographic experts answering the survey were asked to indicate the level of agreement with each of these statements on a scale of 'strongly agree', 'agree', 'neutral', 'disagree', and 'strongly disagree'. Respondents also provided an estimate of the future fertility rate in the selected country or region in 2050 and 2100 as well as an estimate of the level of uncertainty by indicating the high and low point of a range of values where future fertility would likely fall into (80% confidence interval). Using a semi-Delphi approach, the estimates were collected before and after answering the statements.

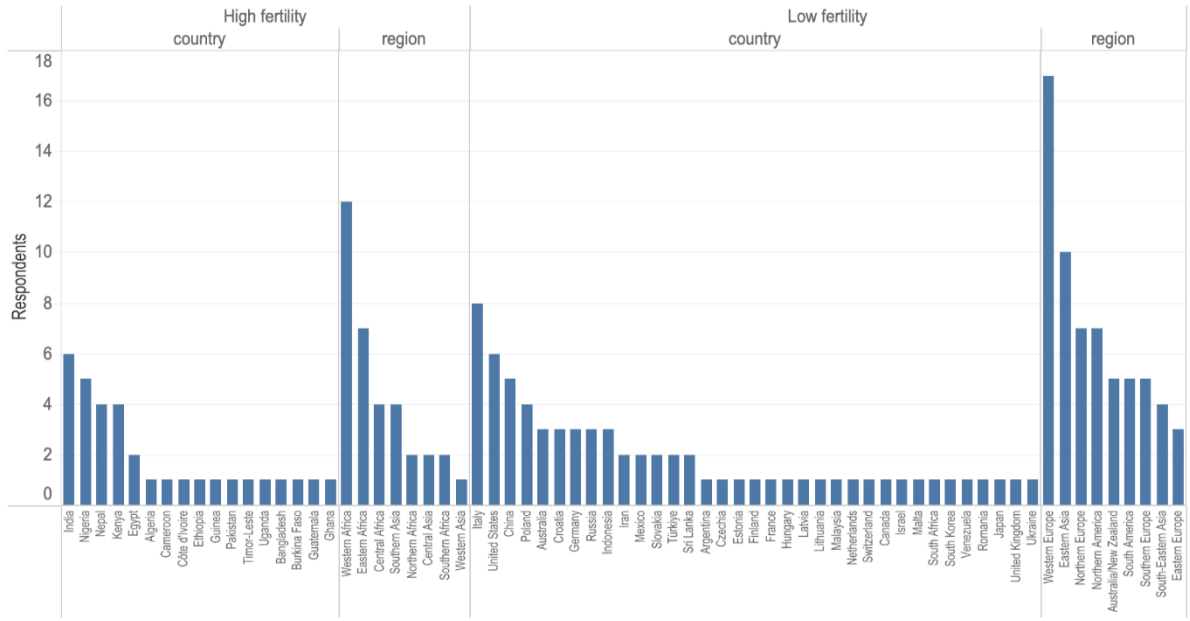
The chapter continues as follows: In a first part, the expert opinions on factors driving future fertility trends in high fertility countries and in low fertility countries are presented separately. This is followed by a brief comparison of drivers of fertility across high and low fertility countries. In a second part, the provided estimates of future fertility levels by experts are presented and then compared to findings from the previous 2011 round of the survey as well to estimates taken from existing population projections.

2.3. Description of statements

2.3.1. Expert opinion on driver of fertility levels in high fertility countries

For the module on high fertility countries, 37 statements were formulated and organized under five categories: Cultural change and ideal family size (8 statements); Health and child survival (4 statements); Status of women and family in society (9 statements); Reproductive health (9 statements); and Economic costs and benefits (7 statements). In total, 68 demographic experts provided answers to high fertility module covering 26 countries or regions. Figure 3 provides information of the geographic distribution of countries and regions for which experts provided responses. Figure 4 shows the detailed results across statements.

Figure 3. Distribution of responses by country and regions, fertility module

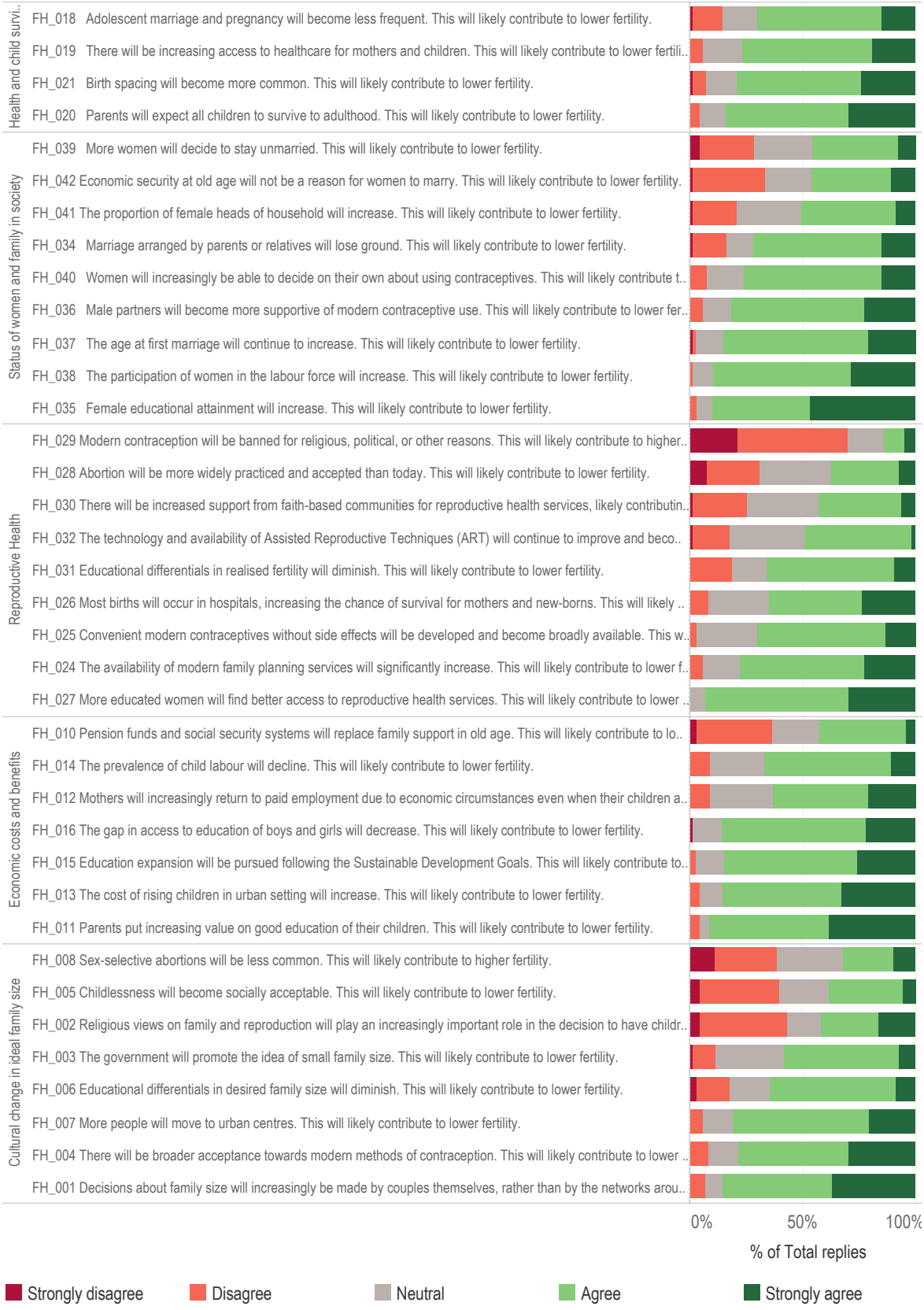


Source: Global Demographic Expert Survey

Expert opinion varies across the arguments on the impact of cultural change on social norms regarding ideal family size. Three of the eight statements received widespread agreement, with around 80 per cent of the combined responses of strong agreement and agreement. The experts believe that future lower fertility levels will be a consequence of couples in high fertility countries being increasingly able to make decisions about the number of children they want to have independently of family and community, of wider acceptance of modern contraceptive methods in societies, and of the continuing process of urbanisation. There is also majority agreement that government promotion of the idea of small families and a reduction in educational differences in desired family size will contribute to a future decline in fertility.

Opinion is also mixed on the impact on fertility of changing norms about the place of women and the family in society. There is a high level of agreement with statements relating to structural changes in gender roles. Almost 90 per cent of the experts see future increases in female educational attainment and female labour force participation as a driver for lower fertility. More than 80 per cent also believe that the age at first marriage will continue to rise and that male partners will become more supportive of the use of modern contraception. The experts are less convinced about the prospects for women's autonomy and its influence on fertility. Less than half of the experts agreed with the statements that lower fertility levels could be driven by more women choosing to remain unmarried, by more female heads of household, or by women having less need to marry to ensure economic security in old age.

Figure 4. Drivers of fertility in high fertility countries by thematic section, by degree of agreement



Source: Global Demographic Expert Survey

There is general agreement that improvements in health care and reductions in infant mortality will be a factor in families deciding to have fewer children. All four statements received at least 70 per cent agreement. There was particularly strong agreement for the argument that families may choose to have fewer children because they are more confident that the children will survive into adulthood, with 29 per cent of experts strongly agreeing and a further 54 per cent agreeing. Just under 80 per cent of experts strongly agreed or agreed that improved access to health care for mothers and children and an increase in birth spacing will contribute to lower fertility.

Experts also agree on statements about future developments in reproductive health, expressing optimism that advances in technology, access and choice will contribute to lower fertility levels. There is near-unanimous agreement (93%) that more educated women will have better access to reproductive health services, which in turn will contribute to lower fertility as women's educational attainment improves. Experts are also confident that progress on the supply side of contraception and family planning services will lead to lower fertility. Around 70 per cent see an increase in modern family planning services and the development and wider availability of convenient modern contraceptive methods without side effects as relevant factors. Few experts (14 per cent) believe that modern contraception could be banned for religious, political or other reasons. However, less than half of respondents see increased support for reproductive health services from faith-based communities, which are important actors in influencing reproductive health messaging and behavior change within communities.

Experts see changes in the economic costs and benefits of having children as contributing to lower fertility. Again, the highest level of agreement is on education as a driver of lower fertility, with parents placing increasing value on a good education for their children. More than 90 per cent of experts agreed with this statement, including 38 per cent who strongly agreed. More than 80 per cent also agreed with the other two statements in this section on education contributing to lower fertility, that the gap in access to education between boys and girls will narrow, and that education will be expanded in line with the global development goals formulated in the UN's 2030 Agenda for Sustainable Development. There is also strong agreement that rising costs of having children in urban areas, such as expensive housing markets, higher expenses and changing lifestyles, will discourage couples from having children and contribute to lower fertility. There was much less agreement on the influence of future developments in social welfare. Only 43 per cent of experts agree (including only 4 per cent who strongly agree) that pension funds and social security systems will replace family support in old age in high fertility countries and contribute to lower fertility.

2.3.2. Expert opinion on the drivers of fertility in low fertility countries

For the module on low fertility countries, 45 statements were formulated and organized under six categories: Cultural and social forces in fertility ideals, norms, and desires (7 statements); Partnership, living arrangements and gender differences (9 statements); Role of policies (9 statements); Employment and economy (11 statements); Biomedical and the timing of parenthood (6 statements); and Education (3 statements). With the future direction of fertility levels in low fertility countries uncertain, 17 of the total of 45 statements concerned drivers associated with increasing fertility levels and the remaining 28 concerned drivers associated with decreasing fertility levels. 132 demographic experts provided answers to low fertility module covering 44 countries or regions. Figure 3 provides information on the geographic distribution of responses. Figure 5 shows the detailed results for each statement.

Expert opinion was mixed on the role of cultural and social forces in fertility beliefs, norms and desires. Only one statement on cultural change as a driver of low fertility received a high level of agreement, with more than 80 per cent agreeing that voluntary childlessness is becoming more common and socially accepted. 70 per cent of experts also agreed that young people's preoccupation with the future could lead to lower fertility. The experts were divided on whether thinking about climate change in particular was causing concern about the future and people's attitudes to reproduction. At the same time, there was widespread disagreement, with over 70% disagreeing with statements about factors increasing fertility levels. Experts are not convinced that fertility is rising neither as a result of an increase in population groups that tend to have larger families nor as a result of increasing importance of religious views on family and reproduction..

Figure 5. Drivers of fertility in low fertility countries by thematic section, by degree of agreement

Source: Global Demographic Expert Survey

Changes in partnership, living arrangements and gender differences were not strongly associated with future fertility levels. There was the most agreement on the role of partnership and lifestyle. Around 70 per cent of experts agreed that fertility could decline as people increasingly pursue lifestyles and activities that are incompatible with parenthood. Some 60 per cent also saw increasing difficulties for people to find the right partner to start a family, especially for highly educated women, as contributing to lower fertility. At least 50 per cent also see increasing diversity in gender relations and alternative family models as contributing to this trend. The experts were most sceptical about the idea that fertility could rise as a result of women achieving full equality with men in terms of education, career and income. Opinion on the role of decline in marriages, the division of housework and childcare between men and women, the help of grandparents with childcare, and partnership dissolution and 're-partnering' for future fertility levels was divided.

Experts believe that governments in low fertility countries are likely to introduce family support policies and financial incentives to increase fertility. The most popular policies, with over 70 per cent of respondents agreeing, are increasing child allowances and tax benefits and introducing birth bonuses (often called family- or baby-bonus). More than 50% of experts also agreed that governments will introduce social policies such as universal access to early childhood education, affordable housing for families and better support for returning to work after having children. While the experts were much less confident about the introduction of state support for women who wish to have children without a partner, they also did not think that governments would increasingly pursue pro-natalist policies to increase fertility, which could be at the expense of restricting sexual and reproductive rights. In addition, a small majority of experts agree that as the population ages, government resources will increasingly be directed towards older people, which could lead to lower fertility.

Changes in employment and the economy are not generally seen as influencing fertility, but economic uncertainty and rising living costs are seen as leading to lower fertility. Most of the 11 statements were supported by less than 50% of the experts and about a third were neutral. Only three statements, suggesting that economic uncertainty, stagnating or falling incomes and rising house prices would discourage people from having children, received a high level of agreement from experts. The experts are not convinced that informal childcare would shift from grandparents to domestic workers, leading to lower fertility. Nor do they see cities becoming more child-friendly as being linked to a rise in fertility. However, about half of the experts see a link between immigration from high fertility countries to low fertility countries and an increase in fertility levels, as well as greater flexibility in working practices.

There is agreement that the timing of parenthood in low fertility countries will continue to increase and contribute to fertility decline, with biomedical advances also seen as playing a role. Almost 90 per cent of experts believe that delayed parenthood will become more common and is likely to contribute to fertility decline. More than 70 per cent also agreed that having children before the age of 25 will become less common. At the same time, most experts do not believe that the use of induced abortion will increase. In terms of biomedical advances, more than half of the experts believe that improvements in the technology, availability and affordability of assisted reproductive techniques (ART), including egg freezing, will contribute to an increase in fertility. About half of the experts believe that declining sperm count and quality will contribute to a decline in fertility.

The level of education of individuals is strongly linked to their fertility outcomes and interacts with many other social, cultural or economic factors. Regarding the level of education itself, most experts believe that people will spend more and more years of their young adult life in education and training, which will contribute to lower fertility. Half of the experts also believe that the majority of people will enter tertiary education, resulting in a decline in fertility. Experts are divided on the future fertility of better educated women, who have generally tended to have fewer children. While 30 per cent believe that the fertility of better educated women will increase as they pursue a professional career, more experts, 44 per cent, disagree.

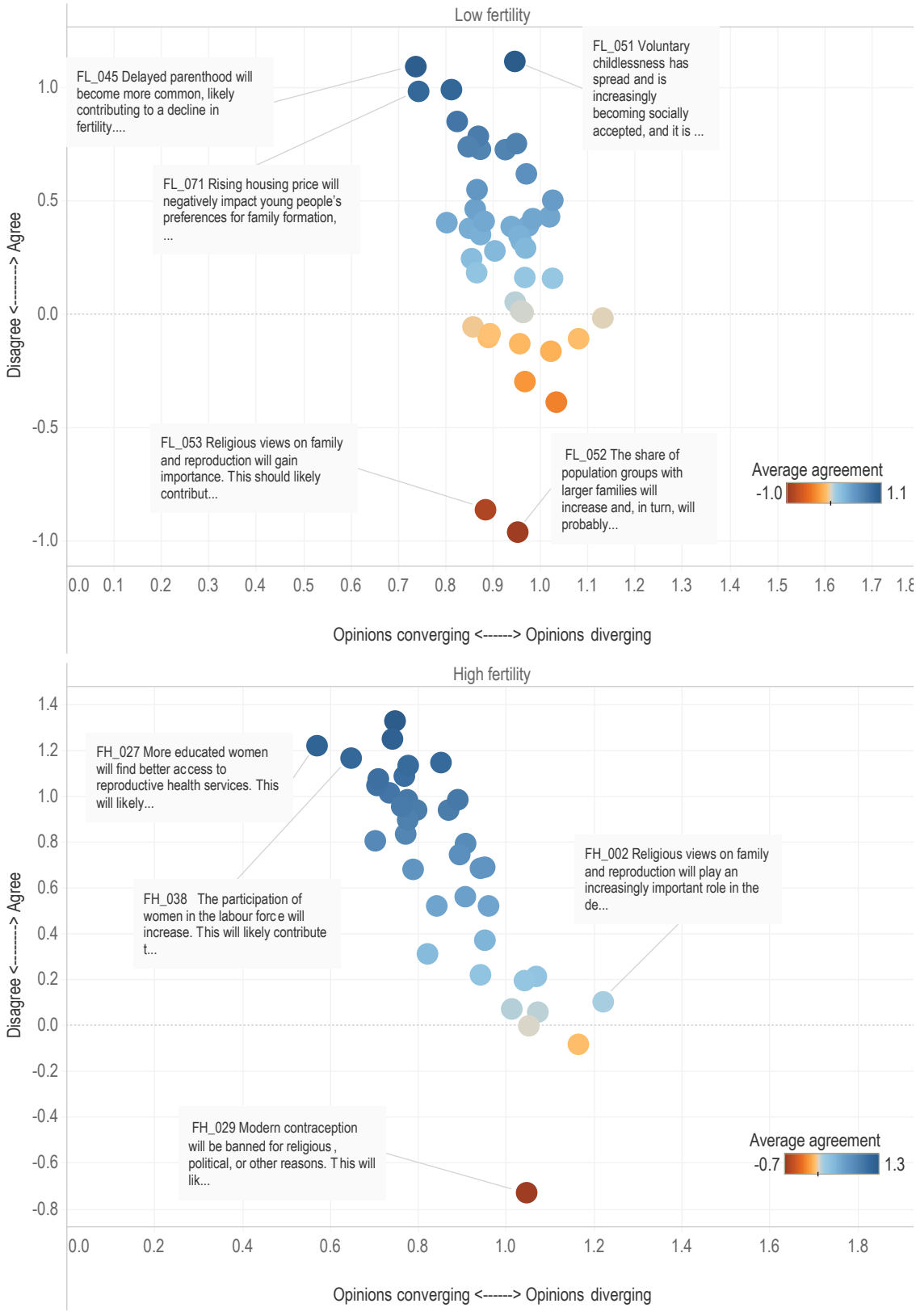
2.4. Results of the survey

2.4.1. Comparison across statements for high and low fertility countries

The differences in expert opinion across statements can be observed in Figure 6. It gives an overview of the average agreement and the degree of convergence recorded for each of the statements in the fertility section of the survey. The lower panel shows the results for high fertility countries and the upper panel shows the results for low fertility countries. On the y-axis, agreement is expressed as the simple average of the responses after converting the discrete values of "strongly agree", "agree", "neutral", "disagree" and "strongly disagree" into a continuous scale between -2 ("strongly disagree") and +2 ("strongly agree). The higher the value the stronger the agreement about the argument on average among experts. On the x-axis, the standard deviation is used to

indicate the degree of convergence in expert opinion for each statement. A lower value indicates higher convergence. In addition to the simple average, it provides information on how divided experts opinion was on a particular statement.

Figure 6. Level of agreement and convergence of expert opinions on statements regarding drivers of fertility in low fertility countries and in high fertility countries



Source: Global Demographic Expert Survey

Each dot represents a statement. The x-axis shows the standard deviation of the responses. The y-axis shows the average agreement. The responses have been converted in a continuous measure from strongly disagree (-2) to strongly agree (+2) with neutral (0).

For both groups of countries, there is a general tendency for experts to agree with the statement and a greater convergence with increasing levels of agreement. There are few statements with negative mean scores, indicating general disagreement. This pattern may be related to the way the statements were worded, either encouraging agreement and convergence, or polarisation with both positive and negative opinions.

However, the results suggest that overall there is more agreement among experts with statements about high fertility countries than with statements about low fertility countries. The statements concerning high fertility countries have higher agreement scores with greater convergence in expert opinion. In fact, there are only two statements about factors in high fertility countries that received more disagreement than agreement. And strong disagreement is only found for the argument that banning modern contraception for religious or political reasons can increase fertility. The highest scores of agreement and convergence for statements about high fertility countries are achieved by those related to the interaction of education with other factors. Expert agreed the most on increased female educational attainment lowering fertility in the context of change in the status of women. The most convergence among experts is on the link of education and access to reproductive health to fertility. Statements concerning the role of a general education expansion in the course of development, urbanisation, greater labour market opportunities for women and an increasing value of good education as factors lowering fertility also show high agreement and convergence.

In the section on low fertility countries, the most agreement and convergence can be observed for statements related to the dampening effect on fertility of certain economic factors, uncertainty and rising costs of living, especially house prices; and factors related to the timing of parenthood, with delayed parenthood becoming more common and parenthood before the age of 25 becoming less common. 10 of the 45 statements on drivers of fertility in low fertility countries have a negative average score indicating general disagreement. In particular, there is common disagreement that religious views on family and reproduction could gain importance or an increase in the share of population groups with larger families would increase fertility.

The higher agreement in expert opinion on statements explaining factors influencing fertility might reflect the state of theory to explain fertility levels from which the statements are derived. The Demographic Transition, that high fertility countries continue to undergo, has been well researched and the many countries that have passed through it provide a solid basis for deriving theoretical explanation from a wealth of empirical research in different regions of the world. Trends in low fertility countries, which are in the post-transition phase, remain difficult to explain and project using theories such as the Second Demographic Theory. While fertility generally remains below replacement level once a country has entered the post-transition phase, demographic research is still needed to better explain and project fertility trends, which in many countries fluctuate periodically, going from low levels of fertility of around 1.8 births per woman and to very low levels of fertility around 1.2 births per woman and vice versa.

2.4.2. Expert estimates of future fertility levels

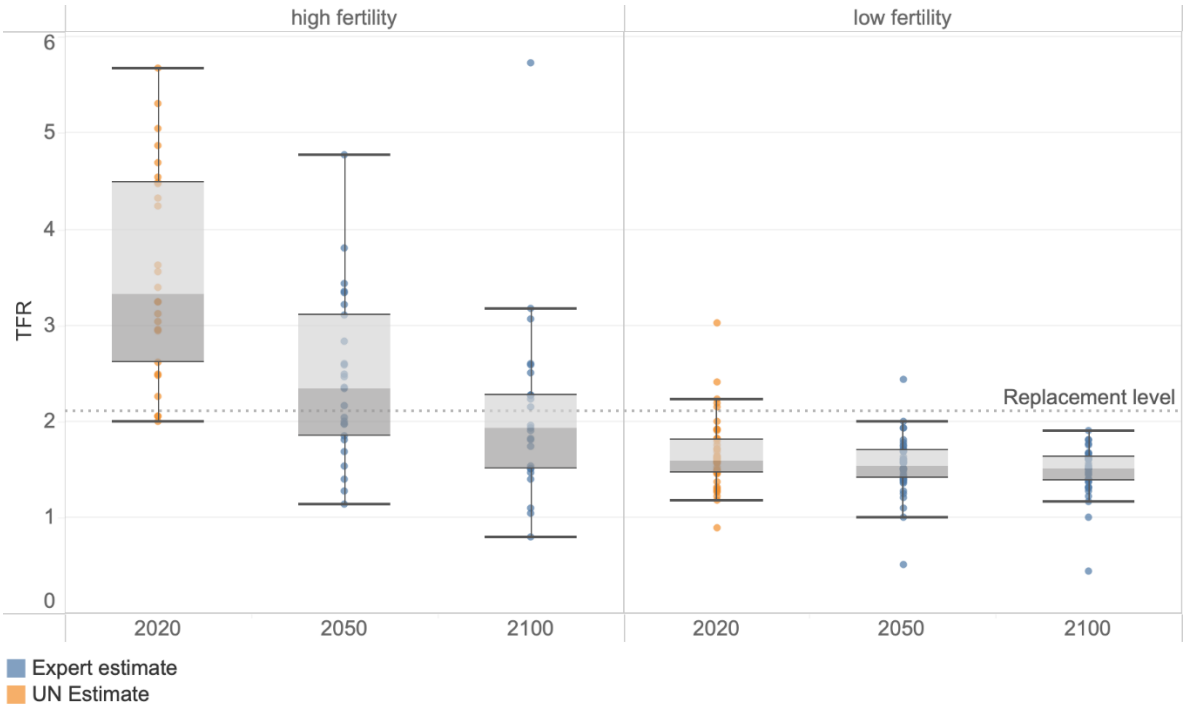
Experts were asked to provide for a selected country or region an estimate of the future trend in fertility by entering estimates of the Total Fertility Rate in 2050 and 2100. The values were entered before answering to statements on the drivers of fertility, but could be revised after. For low fertility countries, 132 experts answered covering 25 countries or regions. For high fertility countries, the number of expert estimates was 68 covering 44 countries or regions.

Figure 7 shows the expert estimates for country or regions for 2050 and 2100 and also shows the current level of fertility in the covered countries according to UN data (UNDESA 2022). Where more than one expert provided an estimate for the same country or region, the average has been taken so that it enters as a single point in the analysis. The central tendency and spread of the distribution of estimates are summarised in the box plots that underlie the values. The median, the midpoint of the box plots, is used to compare the expert estimates for 2050 and 2100. Although it does not cover all countries, comparing the change in estimates over time shows how experts think fertility will develop in countries with high fertility today and in countries with low fertility today.

The results for high fertility countries show that experts generally assume a continued transition to lower fertility rates. The median Total Fertility Rate for the sample of countries and regions covered is 2.3 births per woman in 2050, one births per women down from the median of the current level of fertility in the covered countries. Across countries and regions, experts foresee for 2050 that 50% of the estimates fall between 1.9

and 3.0 births per woman and a quarter of the estimates above 3 births per woman. For 2100, the median estimate is 1.9 births per woman, which is now below replacement level, 50% of the estimates are between 1.5 and 2.3 births per woman, and very few estimates are above 3 births per woman.

Figure 7. Survey results of expert opinion on the future level of fertility in 2050 and in 2100 in high and low fertility countries



Source: Global Demographic Expert Survey, UNDESA (2022)
Note: Orange dots are the UNDESA estimates the current Total Fertility Rate (TFR) for the countries and regions where expert responses are available. Each blue dot represents the mean of the estimates given for a specific country by experts for 2050 and 2100. The box plot in black summarises the distribution of the estimates. The box in the middle represents the interquartile range (50% of values closest to the median). The median splits the distribution in the middle so that half of the values are above and half below the line (25% on each side in the shaded areas in the box). The whiskers extend from the box to show the data's minimum and maximum values within a specified range, with outliers displayed as individual points. The dotted line indicates the general replacement level of fertility at a TFR of 2.1 births per woman.

For low fertility countries, the estimated level of fertility over the medium term to 2050 and the long-term to 2100 is relatively similar. The median estimate of the Total Fertility Rate for both years is 1.5 births per woman which is marginally lower with 0.1 births per woman than median of current fertility levels in the covered countries at 1.6 births per woman. The distribution of expert estimates becomes slightly narrower. In 2050, 50 per cent of values fall between 1.4 and 1.7 births per woman. In 2100, 50 per cent of values fall between 1.4 and 1.6 births per woman. In both years, almost all values stay between one to two births per woman. The similarity of estimates in low fertility countries over such a long period underlines that the future course of fertility in countries that have completed the demographic transition remains difficult to anticipate on the basis of past trends and experience. While demographers would agree that fertility levels in 2050 and 2100 are likely to be different, they proceed with the assumption that fertility will remain at similar level, staying below the replacement level, yet also not falling far below a minimum of about 1 birth per woman..

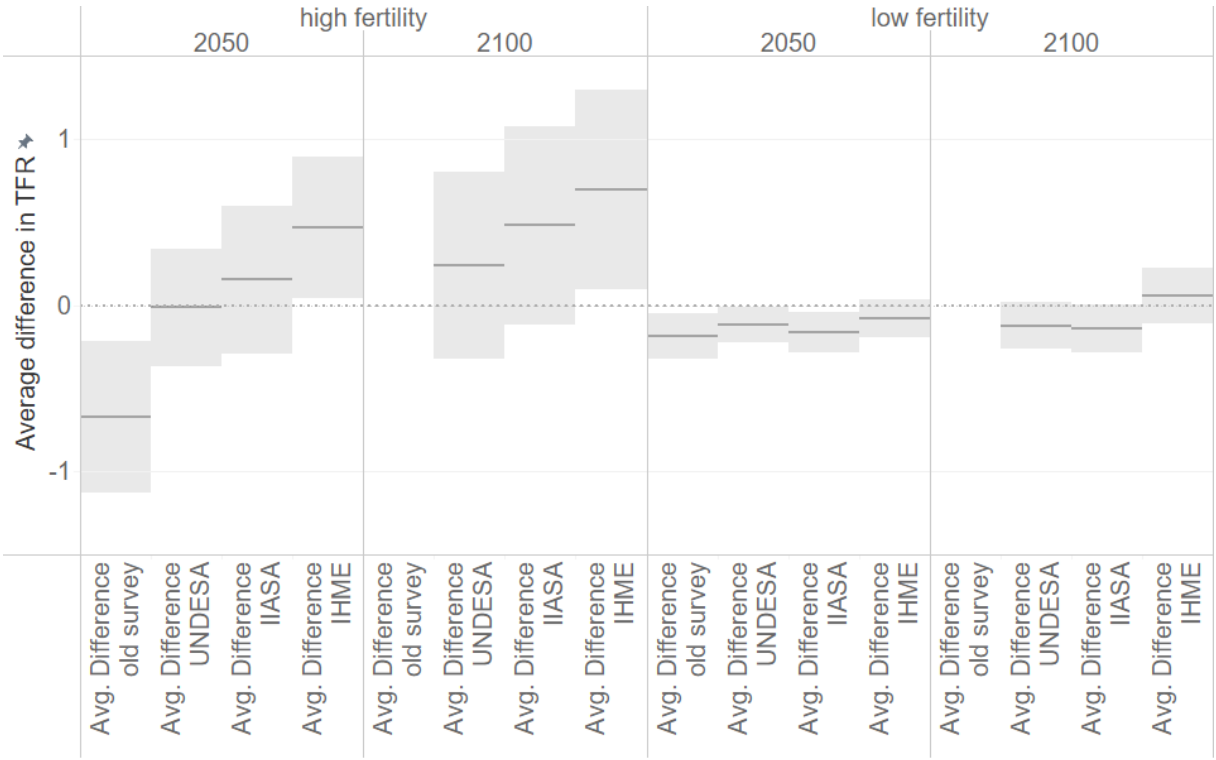
A comparison of the expert estimates with the most recent projections by UNDESA (2022), IIASA (2023) and IHME (2020) shows that the assumptions underlying these projections foresee a faster speed of the fertility transition in high fertility countries and the recovery of fertility rates in low fertility countries, compared to survey respondents. Figure 8 shows the difference between the expert estimates and the estimates of the existing population projections for the sample of countries covered by the survey. Estimates are also compared with the previous round of the survey, carried out in 2010-2011. A positive value indicates that the expert estimates in the survey were higher than the comparable estimate.

For the sample of high fertility countries, experts indicate similar fertility rates only with UN projections and only for 2050. The experts' projections for 2050 and 2100 are generally higher than the published projections, which are based on different demographic models. However, the experts now see a faster decline in fertility rates than in the previous round of the survey about a decade ago. The speed of this future fertility transition

in countries with still high fertility rates will be the key determinant of future world population growth, which is projected to end in the second half of this century.

For the sample of low fertility countries, the estimates of fertility rates for 2050 and 2100 provided by the experts are slightly lower on average than those in the projections models. For the covered countries, experts assume that fertility levels remain at low levels which is, for example, different from the demographic model used by the UN which assumes small long-term increases in fertility in post-transition countries while also staying below replacement level. The experts' lack of agreement with the perspective of recovery from low (or ultra-low) fertility levels is evident in their opinions on the drivers of fertility in low fertility countries. The highest level of agreement among experts is observed in statements related to trends to lower fertility.

Figure 8. Difference in projected TFR between expert opinion and population projections for 2050 and 2100



Source: Global Demographic Expert Survey

Note: The figure shows the mean absolute difference in the number of children per woman in estimates provided by experts from those provided in the 2010-2011 version of the survey as well as the mean difference from published population projections: the difference from the medium projection of UNDESA (2022), from the SSP2 projection of IIASA (2023) , and from the 2019 projections of IHME (2020).

2.5. Conclusions

The fertility module covered a broad range of arguments about the drivers of fertility and the influence on future trends. There is common agreement among demographic experts on what is driving the future course of fertility, but variations exist between arguments concerning high and low fertility countries.

Experts highly agree on the drivers of fertility in high fertility countries based on the model of the Demographic Transition and the process of births rates declining from high levels to low levels as societies undergo social and economic development. The role of urbanisation, reductions in child mortality, greater educational and employment opportunities for women, increasing age at first marriage, broader acceptance of modern contraception, and change in family ideals in decreasing fertility outcomes is almost unanimously supported by survey respondents. Among the few more contested arguments on what influences fertility in high fertility countries are the role of abortion, childlessness, religious views on family and reproduction and the replacement of family support by social security systems.

Experts are more divided over the drivers of future fertility in countries that have completed the Demographic Transition and now experience low levels of fertility. Factors that could contribute to further declines in fertility levels are widely seen in delayed parenthood, the social acceptance of childlessness, economic uncertainty, as well as housing costs. Factors potentially increasing fertility levels are seen by experts in government policies

such as the provision of universal access to childcare and child subsidies and to a lesser degree in greater availability and advancement of technology assisting reproduction and more flexible work practices.

According to expert-based assumptions, the number of births per women in current high fertility countries will continue to decline over the coming decades with many and becoming low fertility countries by the end of the century. However, the pace of the fertility transition anticipated by experts is slower compared to existing model-based population projections.

For low fertility countries, experts predict that fertility levels will remain at low or very low levels between about 1 and 2 birth per woman. They anticipate slightly lower levels of fertility than what is projected in existing model-based population projections.

3. Chapter 3: Mortality

3.1. Key Messages

- Expert opinion broadly anticipates the continued ascent of life expectancy across world regions throughout the century, with the pace of gains strongest in today's 'low mortality' countries.
- The respondents for low mortality countries generally shared an expectation that future medical advances and the further spread of health-conscious behaviours will positively influence longevity.
- While the fate of economic problems and the access to medical services were the sources of greatest disagreement for high mortality countries, the most disputed topics for low mortality countries concerned the persistence of lifespan differentials among sub-populations, the resilience of health systems, and the potential effects of climate change.
- According to the respondents, Europe and East Asia will achieve similar average life expectancies at birth in 2050 (~83 years), after which East Asia reaches almost 89.5 years by 2100, surpassing Europe by about 3.5 years.
- In contrast to the values for Europe, East Asia, and Australia-New Zealand, life expectancy in North America was expected to see relative stagnation and remain at lower levels (~82.5 years in 2100).
- As the world's highest mortality region, Sub-Saharan Africa was estimated to oversee a rapid jump in life expectancy to 72.1 years by 2050 (near the 2023 global average), and then 77.1 by 2100.
- Within Europe, the respondents expected Eastern Europe to see the largest gains in longevity. Southern Europeans are predicted to remain the oldest living in Europe through 2050, after which the experts believe a convergence in life expectancy will take place between the South, West, and North of Europe around 87 years by 2100.

3.2. Background

Length of life clearly impacts the outlook and well-being of an individual. At the level of a population, average life expectancy profoundly shapes society's character, influencing everything from economic activity and the structure of families to political attitudes and the collective appetite for risk-taking (Agree 2018; Buchmeier & Vogt 2023; Shao & Lee 2014). Given the ongoing increase in lifespans, and the implications for societies, this survey sought to establish the latest thinking among demographic experts about the future of mortality.

While the general upward trajectory of life expectancy is relatively agreed upon (for the long-term at the global level), demographers and other health professionals are nowhere near a consensus on the extent to which human life will, or even can, be extended. Divergent findings either suggest that human lifespans have a clear biological ceiling (for example at 120 years; Geddes 2016), or that there is no natural limit at all (Gavrilov et al. 2017; Dolgin 2018).

Further uncertainty surrounds the durability of previous gains in longevity. Recent stagnation or even backslides have taken place in the last decade, prominently in the United States, where life expectancy stood at 76.4 years in 2023 (Harvard 2023). The US opioid crisis and shortcomings in preventative healthcare are among the drivers of the largely unanticipated drop in life expectancy (Woolf et al. 2023). Excess deaths associated with COVID-19 also caused dramatic, mostly short-lived, spikes in mortality throughout much of the world (Schöley et al. 2022). Such questions about the stability and limits of human longevity underscore the challenges in accurately projecting its future course.

The survey's mortality module aims to shed light on the main forces at play. In this regard, the survey fielded questions in five key domains: medical technology, health care systems, individual lifestyle choices, infectious diseases, and environmental exposures. These categories of questions intended to capture the 60% or so of human longevity that is a product of society, with the other approximately 40% directly attributable to genetically inherited traits (Bin-Jumah et al. 2022).

Life expectancy varies substantially by society – with Japan (84.5 years) and Chad (52.5) at opposite ends of the spectrum (World Bank 2023). At the same time, the spread of modern medicine and sanitation has sharply reduced mortality in middle- and low-income countries by cutting into easily preventable diseases. The time it

takes for a country to advance through the first stage of the Demographic Transition – shifting from a 'high' to 'low' mortality regime – is now measured in decades, rather than centuries as initially seen in 19th century Western Europe. The future speed and extent of the rise in life expectancy will have significant impact on population size, population aging, and other major demographic trends of consequence.

3.3. Description of statements

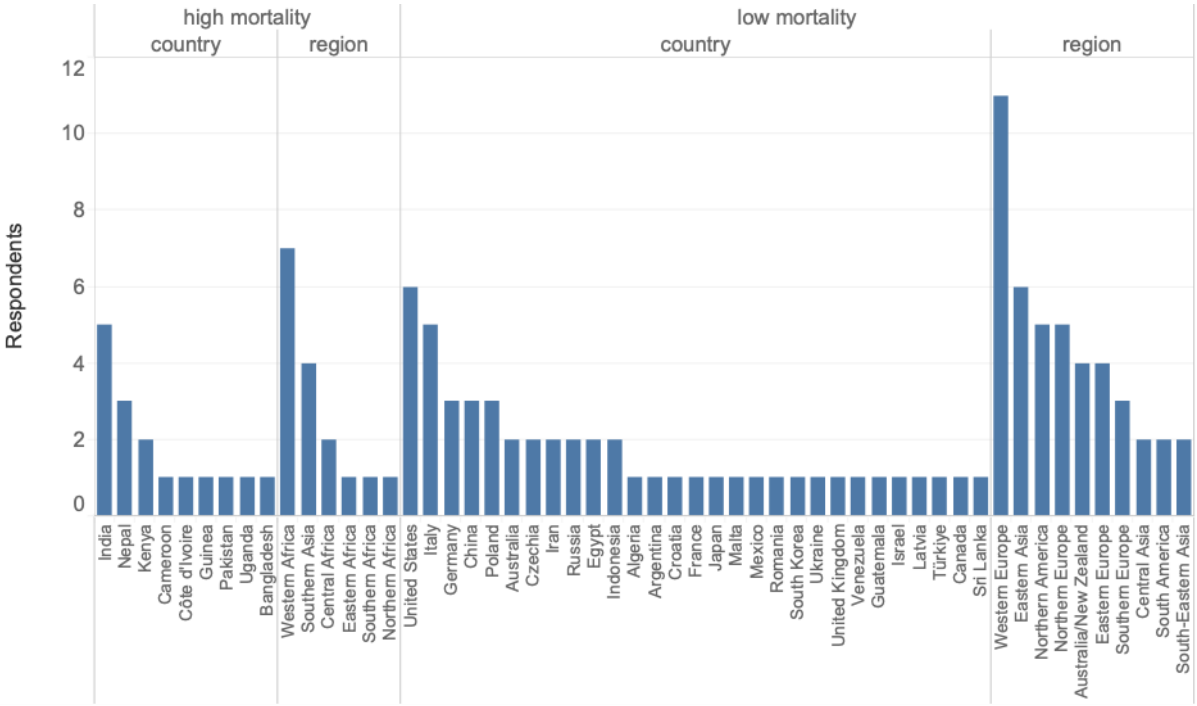
The mortality section was divided into 32 questions for low mortality countries and 35 questions for high mortality countries. With little overlap between the two sets of questions, the survey reflects fundamental differences in mortality-related challenges and socio-economic contexts. Regional groupings of countries were classified in the two categories as follows:

Low mortality: Australia/New Zealand, America (Northern, Central, Southern), Asia (Central, East, West), Europe (Northern, Eastern, Southern, Western)

High mortality: Africa (Northern, Eastern, Central, Southern, & Western), Asia (Southern & South-Eastern), and Melanesia

At the start of the survey the demographic experts were asked, "Based on your knowledge of the empirical evidence, how likely are the arguments below to impact on the average life expectancy of your selected country or region in the period up to 2050?". Respondents could select between five different options ("strongly disagree", "disagree", "neutral", "agree", or "strongly agree"). In total, 127 experts participated in the mortality section, with 94 responses for low mortality countries, and 33 responses for high mortality countries. Figure 9 illustrates the distribution of responses.

Figure 9. Distribution of responses by country and region, mortality module



Source: Global Demographic Expert Survey

3.4. Results of the survey

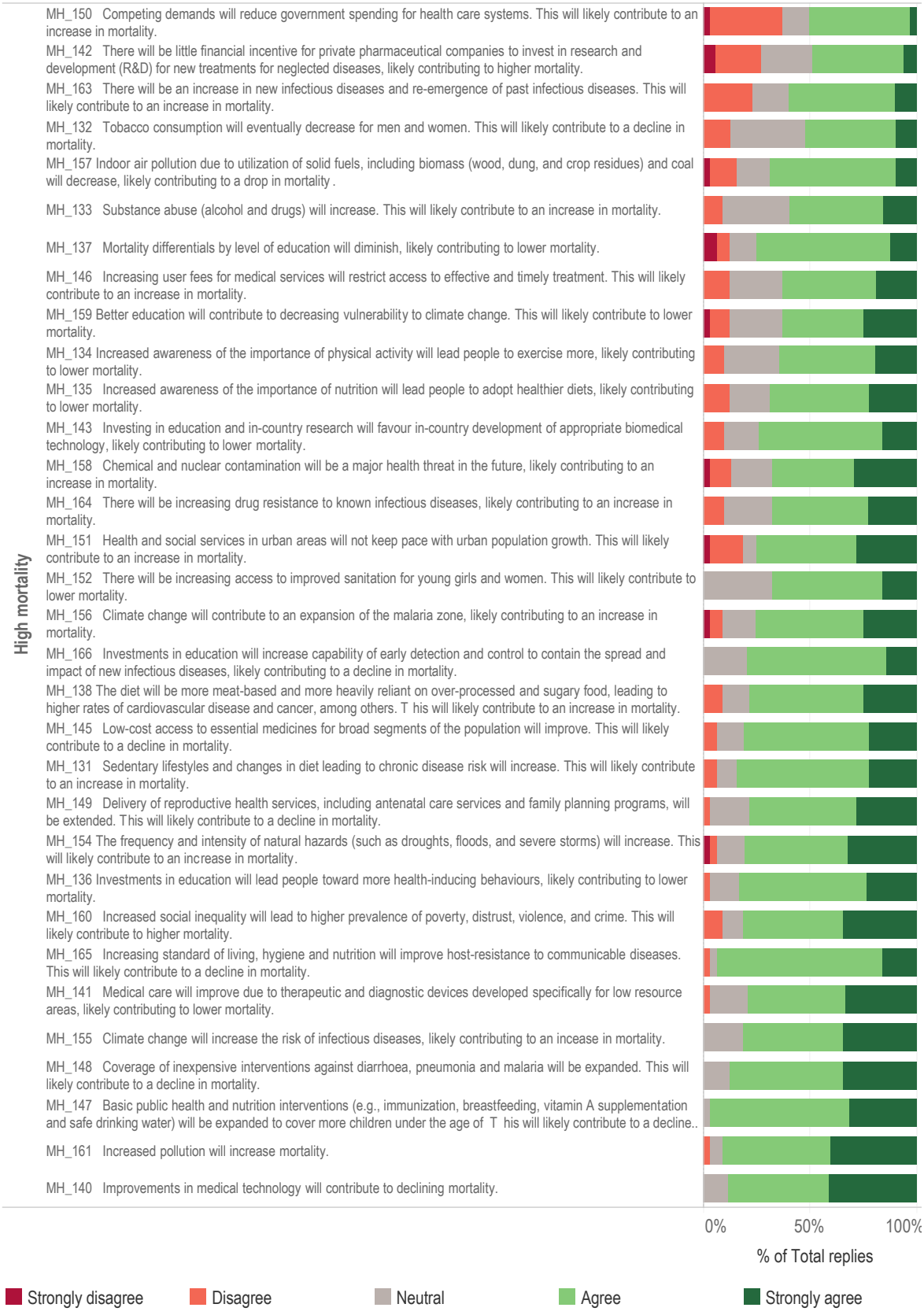
3.4.1. Analysis of statements

The demographic experts were largely of the same mind when presented with the survey arguments. However, a few of the statements evenly split respondents, particularly those who were answering about future trends in low-mortality countries. Figure 10 features the responses for the low mortality countries, including both the most contentious and agreed upon statements at the ends of the table.

Figure 10. Arguments for low mortality countries, by degree of agreement

Source: Global Demographic Expert Survey

Figure 11. Arguments for high mortality countries, by degree of agreement



Source: Global Demographic Expert Survey

On timeless questions of mortality differentials within sub-populations (ML_175 and 176), the respondents slightly favoured a projection that such differences will likely remain intact. Respondents were skeptical about equalization of longevity between men and women, and even more so by level of education.

A near-even split in reactions can be seen for the statements ML_187, 188, 194, 196, and 199, which saw roughly equivalent proportions of agreement, neutrality, and disagreement. These distributions reflect diverging opinions on general long-term dilemmas such as the seriousness of threats from infectious diseases and the future accessibility to new medical techniques, as well as the debated impacts of more specific emerging trends, such as population aging overburdening health systems and possible health impacts from a changing climate.

The areas of agreement for low mortality countries broadly demonstrated a common faith in medical technology and delivery. Furthermore, the experts largely shared the belief that there will be widening adoption of health-conscious behaviours, including less smoking and more active lifestyles (mentally and physically) among the population at older ages, a potential function of generational differences.

Compared to the results for low fertility countries, a higher degree of unity was seen among the high mortality group respondents. This is shown in Figure 11, where a clear majority of responses sided with the arguments featured in the survey, alongside a small number of statements that received more variation in answers. Generally, the respondents expected the continued expansion of existing low-cost medical interventions as well as a host of other similar trends seen in high-income countries. The potential future impacts of socio-economic hardships and the distribution of services appeared less certain in the eyes of the experts.

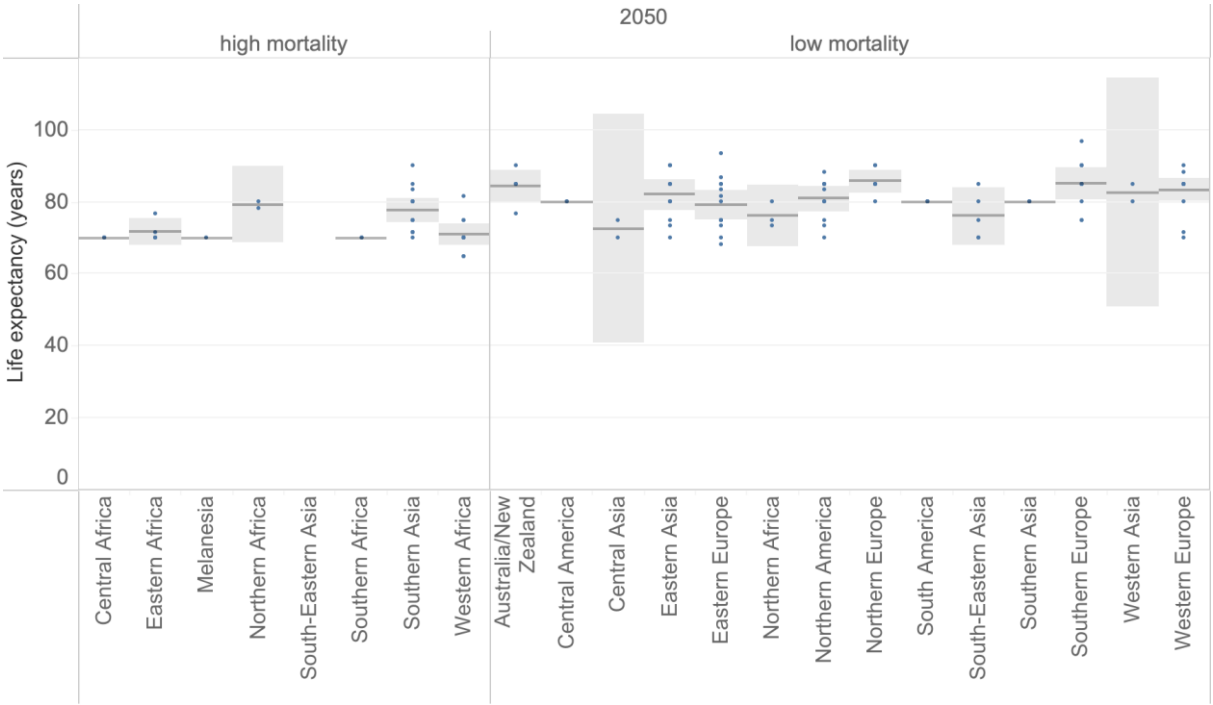
3.5. Quantitative estimates: life expectancy at birth

At both the beginning of the survey and after having gone through the statements section, the demographic experts were asked to provide life expectancy estimates for their region of choice. The questions were phrased as follows:

"What do you think the average life expectancy will be in 2050? Could you provide an estimate also for 2100? Values can range between 50 and 120 years. You can also provide an 80% interval within which you expect the value to lie (uncertainty range)."

"After considering the arguments presented above, if you wish, you now have the chance to revise your estimate for average life expectancy. Values can range between 50 and 120 years. You can also provide an 80% interval within which you expect the value to lie (uncertainty range)."

Figure 12. Estimated life expectancy at birth in 2050



Source: Global Demographic Expert Survey

The initial mortality estimate question was accompanied by a graph illustrating trends in life expectancy at birth from 1950 to present for their selected region, and projected values (from the UN, IIASA, and IHME) starting from 2015 to the end of the century. In line with these well-established projections, the experts agreed about the continued growth in life expectancy ahead to 2050 and 2100. The complete range of life expectancy estimates are shown in Figure 12, by region.

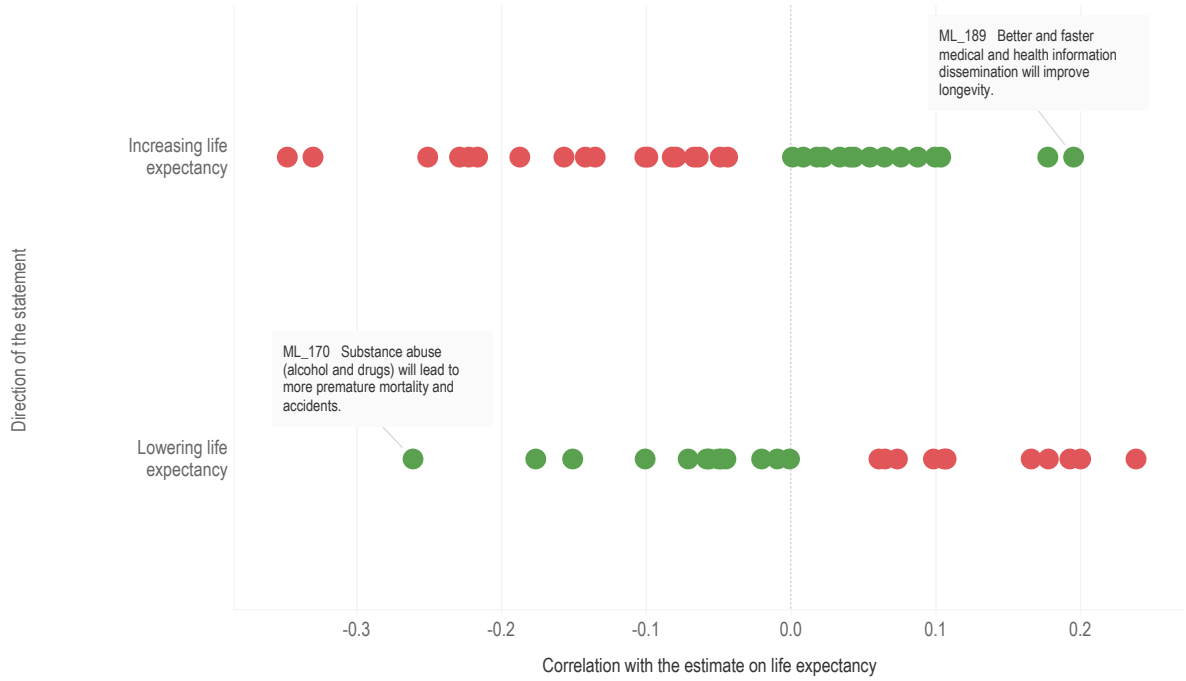
According to the respondents, life expectancy at birth will reach 73.8 years by 2050, and 76.3 by 2100 in the countries classified as 'high mortality' in this survey. At the same time, the equivalent estimates in 'low mortality' countries reach 82 and 85.6 respectively. These values are the averages taken from the two estimates provided by each respondent (before and after completing the statements section). This difference between the two estimates, for example, amounted to an average of +1.5 years for the 2050 estimates that were generated after exposure to the mortality statements section compared to those generated at the start of the survey.

While life expectancy at birth in Europe is estimated to reach 83.3 in 2050 and 85.9 in 2100, important regional differences remain. Between regions, respondents expect Southern Europe to maintain its position as the highest longevity in Europe, with a convergence among Southern, Western, and Northern Europe to 87 years by the end of the century. Eastern Europe, coming from a trend of higher mortality, is expected to make the largest gains in longevity, reaching 83 years by 2100. This is up from 68.2 years for men, and 77.9 years for women in 2015-20.

3.5.1. Statements and future expected trends

According to the survey design, each statement included a claim about the future and how this would affect future mortality (positively or negatively). Figure 13 shows the degree to which responses to questions that indicate one direction for mortality were accompanied by overall mortality estimates in the same direction (green = coherence, red = incoherence). Such analysis gages the relative 'potency' of each argument, where a respondent could agree with the claim and direction of a statement, while simultaneously believing that the phenomenon will not be strong enough to overcome other forces pushing life expectancy at birth in the opposite direction.

Figure 13. Potency of arguments



Source: Global Demographic Expert Survey
Note: The colour of the symbols indicates if the correlation between agreements on statements and estimates have a coherent sign (e.g., we would expect a positive correlation between the agreement on a statement speaking about increasing life expectancy and the estimate for life expectancy).

Compared to the fertility and migration sections of the survey, the mortality results show a higher degree of incoherence, reflecting a higher degree of differences in potency of the arguments according to the respondents. For example, while many of the arguments in isolation indicate a force for higher mortality, they are overpowered by other arguments believed to carry more weight in ultimately determining mortality outcomes. Among the statements that offered an argument in favour of increased life expectancy, ML_189 "Better and faster medical and health information dissemination will improve longevity", received the greatest agreement among the experts. Similarly, the most agreed upon statement working against life expectancy was ML_170, "Substance abuse (alcohol and drugs) will lead to more premature mortality and accidents."

3.6. Conclusions

The mortality section covers a broad range of arguments about the drivers of mortality and their future contributions to either supporting or undercutting longevity. Important variations can be seen in the challenges between the high and low mortality countries, although the survey results suggest that the 'low mortality' group will be expanding with the passage of time.

In spite of the historic speed at which the high mortality countries of today are going through the Demographic Transition, the respondents assume even quicker longevity increases in today's low mortality countries.

The most contested drivers of mortality were seen in the low mortality country responses, where the persistence of lifespan differentials among sub-populations, the efficient organization of health systems, and the potential effects of climate change divided opinions.

In the global context, the experts' estimates indicate that Europe will be slightly behind East Asia and Australia-New Zealand in life expectancy at birth by the end of the century. Within Europe, respondents expected a quicker pace of gains in longevity for Northern and Western Europe, as well as Eastern Europe (which still maintains an important mortality gap) relative to Southern Europe by 2100, the current longevity frontrunner.

4. Chapter 4: Migration

4.1. Key messages

- There was a relatively even spread of replies on the migration module across countries and regions, with a considerable share of responses for Western Europe (16 responses) and Eastern Asia (8 responses).
- The agreement level for each argument varies substantially whether they relate to emigration or immigration. For example, in the climate section, arguments on immigration display an overall higher level of agreement compared to emigration.
- In the demographic factors section, the highest agreement level for both immigration and emigration has been reached by the arguments on population ageing.
- Among the statements that received the greatest agreement and convergence, wage levels are seen as a crucial motivation for migration.
- Forecasts about future emigration and immigration rates vary substantially by region. Respondents expect emigration rates to substantially increase in Africa, Asia, Latin America and the Caribbean. Immigration rates are expected to increase decisively in Europe.

4.2. Background

International migration is increasingly becoming an important component of demographic change in many origin and destination countries, particularly in high-income countries where natural population growth (determined by births and deaths) is low, and where migration can clearly influence population size, more at the local level than at the national level, and both for host countries and countries of origin. Forecasting migration is, however, difficult given the complexity of the migration processes, and the limited understanding of the migration drivers.

This chapter focuses on the results of the migration module. The aim of this module was to collect expert judgements on how potential drivers might affect future emigration and immigration rates, and in which direction. The chapter describes both aspects of migration, namely immigration and emigration, from a country or region perspective.

The chapter begins with an overview of the key papers in the literature on drivers of migration from which the arguments on emigration and immigration included in the survey were drawn. The second part describes the results of the survey; these include a description of the agreement level received by the various arguments developed for this module of the survey, their coherence, and a description of experts' opinions on future emigration and immigration rates.

4.2.1. Drivers of migration

The existing literature on drivers of migration has identified a number of factors which shape migration decisions as well as migration dynamics. In particular, drivers of migration include the characteristics of sending or receiving countries and intermediate factors which can simplify or hinder movements between them (Migali et al. 2018, Czaika and Reinprecht 2022).

Any attempt to systematise the drivers of migration is facing an intrinsic complexity of the interaction of macro, meso and individual migration drivers. This complexity is exemplified in Figure 14 synthesising the results of a meta-analysis in Czaika and Reinprecht (2022) of around 300 empirical studies on drivers of migrations.

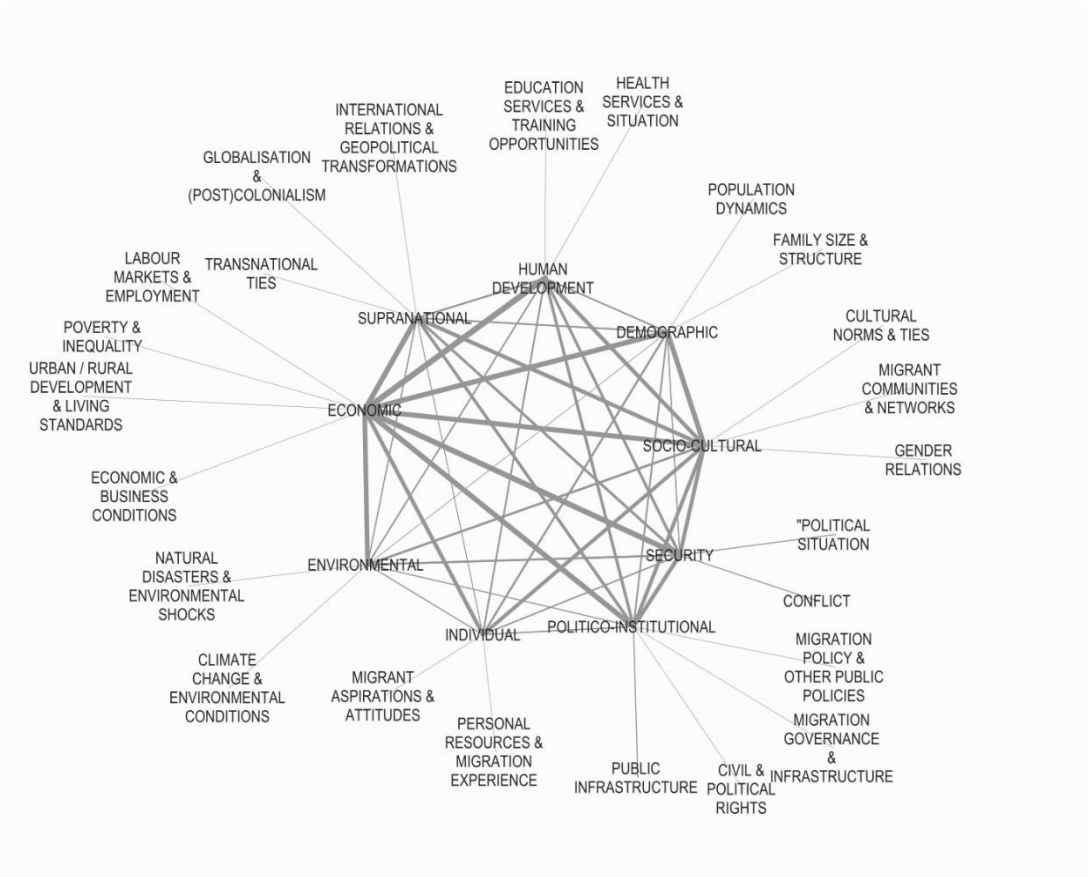
The nodes in this network represent the drivers (with groupings in the internal circle) and the links represent the number of studies which consider the drivers in interactions among these drivers. The figure shows that no single argument, discipline or theory would suffice to give proper representations of the many forms and typologies of migration.

A recent large EU project aimed at exploring the methodology of setting and analysing migration scenarios[10]. Similarly to what was explained above, they also concluded that migration is a field which still lacks a consistent

[10] https://www.quantmig.eu/

theoretical background and that 'migration is too diverse and multifaceted to be explained by a single theory'. This lack of theoretical background should not hinder attempts to formulate projections on future migration but is rather underlying that these projections need to be contextualised 'to specific groups, geographical locations, scales of analyses, forms of migration, and temporal frames'.

Figure 14. Meta-analysis of the literature on migration drivers



Source: Own elaboration based on data presented in Czaika and Reinprecht, (2022)

Our attempt in the survey is more modest than carrying out a systematic review of migration drivers and is focusing on a set of statements which can be expected to play a major role in the context of demographic projections. This simplification is linked to the necessity to accommodate a complex phenomenon as migration in the context of demographic projections and models which can intrinsically cater only for limited set of dimensions about demographic characteristics and explains the many uncertainties related to in particular to the migration component in the context of demographic projections. For this reason, the survey particularly focused on four factors, which have been highlighted in recent migration research, namely climate change, demographic characteristics, economic development, and migration regimes and policies.

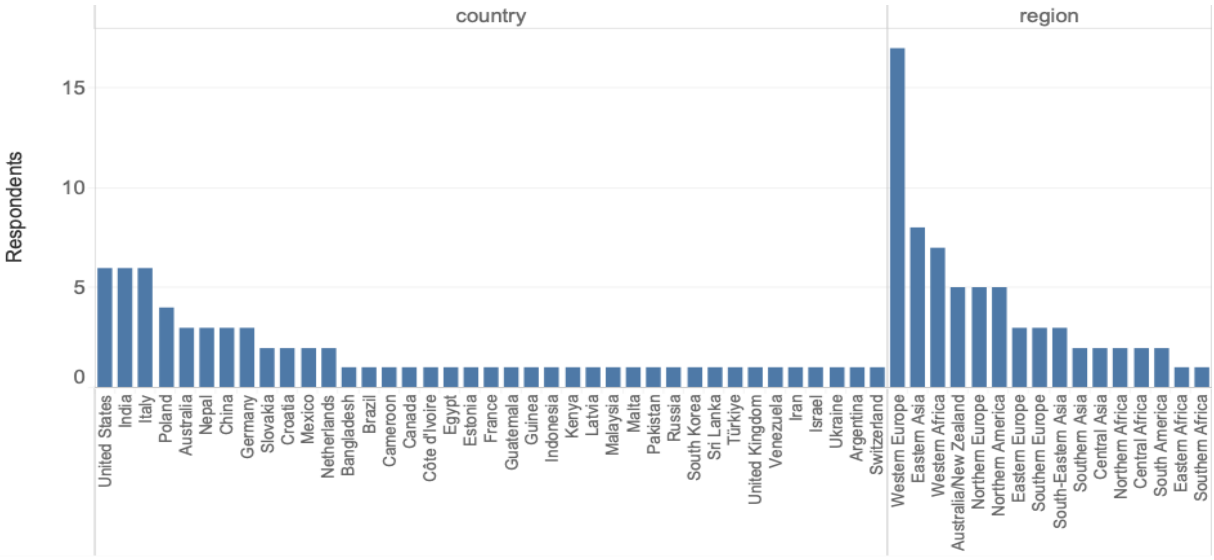
Climate change as a migration driver has been extensively studied within migration research. However, to date, findings of such studies are inconclusive and there is no consensus about the effect of climate change on migration. While some studies find a direct positive relationship between climatic events and population dynamics (Backhaus et al. 2015; Cai et al. 2016; UNCCD 2017), other studies tend to highlight other indirect effects of climate change on migration and focus on the negative impact of decreasing living standards, loss of income and livelihood opportunities (Marchiori et al. 2017). As stressed by the Foresight Report on Migration and Global Environmental Change (2011), which focuses on the interaction between environmental and economic changes, the availability of natural resources can have an effect on the decision to migrate. In particular, groups that rely on natural resources for their income are most likely to be affected when environmental change leads to natural resource scarcity (Black et al. 2011).

Climate change also leads to more frequent occurrence in natural disasters such as floods, droughts and storms, which are known triggers of migration. These events increase international movements through an effect on internal migration (Mbaye 2017). They, however, commonly have negative effects on immigration (Ruyssen and

Rayp 2014). Another way through which environmental changes affect migration is through the reinforcement of economic drivers, such as the lack of employment prospects.

Several studies point to the importance of economic factors as drivers of migration. Economic drivers include both structural economic differences between countries, such as income levels and inequality as well as other elements such as labour market conditions, wages, and employment opportunities. Studies on the topic suggest that individuals migrate with the aim to improve their employment conditions, if favourable economic opportunities are available in destination countries (Migali 2018). In this respect, wage differences between origin and destination locations are a major determinant of migration decisions (World Bank 2018). Wage differentials though only tell one side of the story, as another relevant role is played by employment opportunities across different countries. Studies on the topic suggest that employment opportunities or future career prospects drive migration (Zaiceva and Zimmermann, 2008). The direction might, however, also be negative as lack of employment may also decrease emigration because of poverty constraints (DeWaard et al. 2012).

Figure 15. Distribution of responses by countries and regions, migration module



Source: Global Demographic Expert Survey

Migration drivers are also linked to the demographic characteristics of the receiving and sending countries. Recent empirical research on migration drivers has particularly focused on population size and the population age structure. Existing research suggests that the larger the share of young people within a population, the higher the likelihood to leave a country and, overall, demographic differences are important in explaining migration patterns (Bell et al. 2015, Mbaye 2017).

The last driver considered in the survey is linked to the effects of migration policies in sending or receiving countries. The empirical literature on the effects of immigration policies suggests that immigration policies play a significant role in reducing the flow of migrants. While some countries try to limit the possibilities of people to leave, it is more frequent for countries to narrow down the number of people entering a country. Nevertheless, existing studies highlight how restrictive policies lead to undesired consequences, such as enhancing illegal migration which eventually results in a higher number of migrants (Czaika and de Haas 2017). Despite the positive effect of some migration policies, existing studies on the topic conclude that, when compared to other migration triggers, policies do not have the most important role in affecting migration. In fact, other drivers such as economic ones have a more prominent effect (Migali et al. 2018).

4.3. Description of statements

The section on migration includes 32 statements, and they were clustered according to climate (3 statements), demographic factors (4 statements), economic development (6 statements), migration regimes and policies (4 statements). Each statement was provided considering emigration and immigration (full list in Table 1 in the Annex). The decision to formulate different statements for emigration and immigration stems from the choice to invite experts to reflect on both aspects of migration. For each of the 30 arguments, the experts were asked: 'Based on your understanding of current scientific knowledge and with reference to the period up to 2050, do you think the argument is', and answers included five options ('strongly disagree', 'disagree', 'neutral', 'agree',

'strongly agree'). Overall, the migration module was filled in by 138 respondents. Figure 15 shows the distribution of the responses across selected countries (left side of the figure) and regions (right side of the figure). There was a relatively even spread across countries and regions, with a considerable share of responses for Western Europe (16 responses) and Eastern Asia (8 responses).

4.4. Results of the survey

4.4.1. Agreement with specific statements

Figure 16 provides an overview of the share of responses to each of the argument on future immigration and emigration trends in the climate, demographic factors, economic development, and migration regimes and policies sections.

The agreement level that each argument displays varies substantially between emigration and immigration, reflecting the pattern of countries of origin and destination. For example, in the climate section, arguments on immigration display an overall higher level of agreement compared to emigration. In particular, the statement on the effect of climate change on immigration received the highest share of agreement (MI_126 climate change will increase immigration to country/region, about 49% agreement). In contrast, the same argument received about 20% agreement on the emigration aspect. This result might be linked to the choice of countries and regions from respondents, with the most part of these being Europe or Northern America.

In the demographic factors section, the arguments on population ageing has reached the highest agreement level for both immigration and emigration (MI_096 population ageing in country/region will increase the demand for immigrant workers, 74% agreement; MI_095 Emigration: Population ageing will reduce emigration from country/region, about 52% agreement). The argument on the presence of a network of people in the sending as well as receiving country received the second highest level of agreement (MI_102 Immigration: Having a community of people who speak the same language and share the same culture in country/region will increase the number of people arriving into country/region, about 67% agreement; MI_101 Emigration: Having a community of people who speak the same language and share the same culture abroad will increase the number of people leaving from country/region }, 44% agreement).

Arguments pertaining to the economic development section obtained an overall high agreement level. In particular, two arguments on employment opportunities and high wage levels have received the highest agreement scores for both emigration and immigration (MI_103 Emigration: better employment opportunities abroad will increase emigration from country/region; MI_104 Immigration: Better employment opportunities in country/region will increase immigration to country/region; MI_105 Emigration: Higher wage levels abroad will increase emigration; MI_106 Immigration: Higher wage levels in country/region will increase immigration). In contrast, the argument on the presence of social support systems in receiving countries has received the lowest agreement score on immigration (MI_114 Immigration: Generous social support systems in country/region will increase immigration, about 28% agreement).

The migration regimes and policy section indicates that experts agree greatly to the effect of labour migration schemes especially on immigration (MI_121 Immigration: Labour migration schemes in country/region will increase immigration to country/region, 61% agreement)

Figure 16. Degree of agreement with migration statements

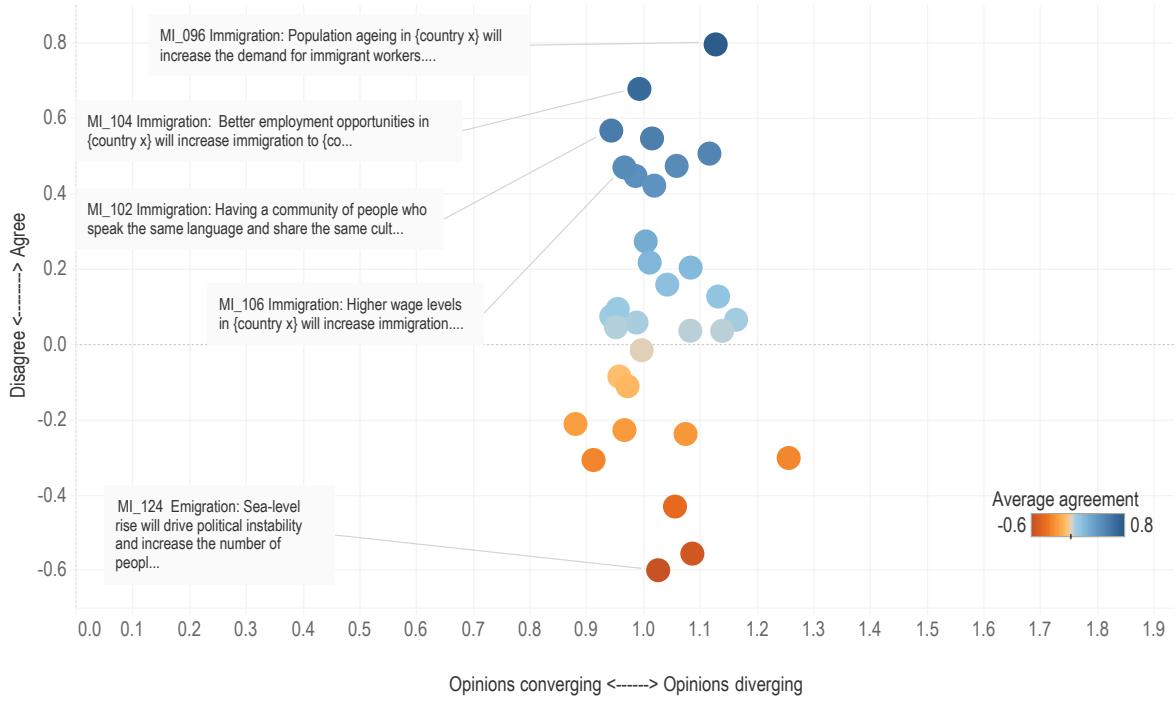
Source: Global Demographic Expert Survey

4.4.2. Agreement and convergence of statements

Figure 17 below illustrates the level of agreement and of convergence recorded for each of the 32 statements in the migration section of the survey. The y-axis shows the agreement level (replies were converted into numerical values from 2 'strongly agree' to -2 'strongly disagree') while the x-axis shows the convergence as standard deviation from the average score.

Overall, in the migration section we can observe a rather high level of agreement with the arguments as shown by the numerous statements in the upper half of the figure. In addition, it is possible to notice a high level of divergence as shown by the presence of a number of statements in the right part of the figure. One of the statements which received the highest agreement and among the highest convergence is about better employment opportunities levels (MI_104). In contrast, a statement about sea-levels rise and political instability (MI_124) received a high level of disagreement accompanied by strong divergence in opinion.

Figure 17. Agreement and convergence of opinions

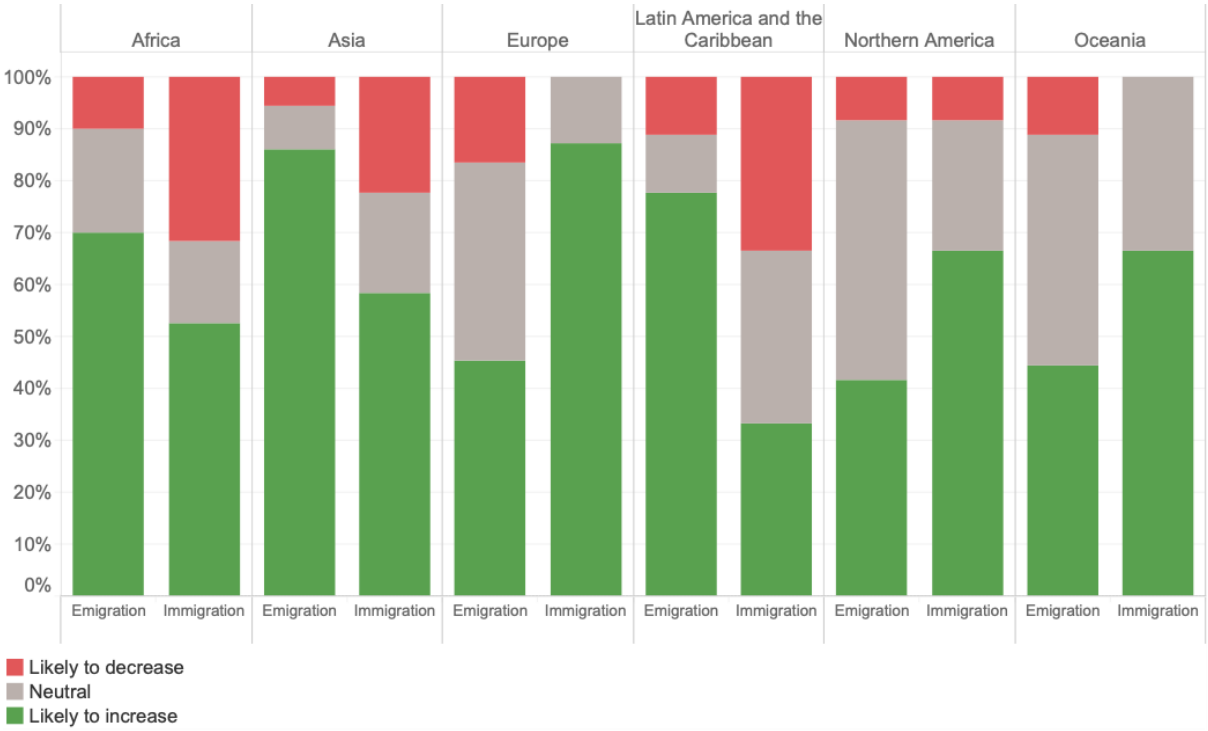


Source: Global Demographic Expert Survey
Note: Each symbol represents a statement. The x-axis represents the standard deviation of the responses and the y-axis the average. The responses have been converted in a continuous measure: -2 (strongly disagree), -1(agree) 0 (neutral) 1(agree) and 2 (strongly agree).

4.5. Quantitative estimates on migration

In the survey, respondents were also asked to indicate the expected direction of emigration and immigration rates in the future. The question reads: 'Based on your knowledge of the empirical evidence, and with reference to the selected country or region, do you think the above trend for immigration (emigration) is' and they were provided with three answer options: 'likely to increase', 'neutral', 'likely to decrease'. As shown in Figure 18, the answers to this question vary substantially by region. Most respondents expect emigration rates to substantially increase in Africa, Asia, Latin America and the Caribbean. Immigration rates are, in contrast, expected to decisively increase in Europe.

Figure 18. Expected direction of change of future emigration and immigration rates, by region

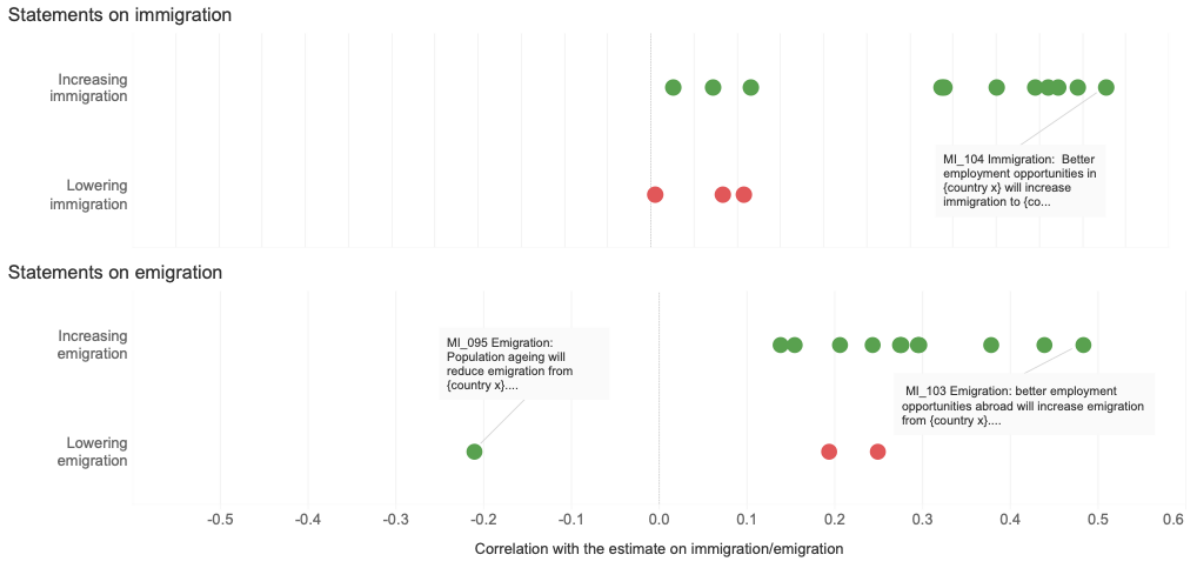


Source: Global Demographic Expert Survey

4.5.1. Statements and future expected trends

After describing the arguments and the estimates information collected in the survey, this section aims at joining the two. Each of the arguments included in the survey includes also a direction of future migration trends; for this reason, it is reasonable to expect that if respondents agree with an argument which forecasts an increase (or decrease) in future migration rates, they would also indicate that migration rates will increase (decrease) in the future. In other words, we expected to see a correspondence between the direction of the argument on the one side, and the change in migration rates on the other. To test this internal coherence we have measured the correlation between the argument agreement and the future trend.

Figure 19. Correlation between agreements to arguments and expected future trends in emigration and immigration rates



Source: Global Demographic Expert Survey
Note: The colour of the symbol indicates if the correlation has a consistent sign with the direction of the statement (e.g., we would expect a positive correlation between the agreement on statements speaking about an increase of immigration and an estimate for immigration).

The result of this test suggests that there is a good level of coherence among emigration arguments, as displayed in Figure 19. Most arguments which point to an increase in emigration are positively correlated with the choice of expected increase in emigration rates in the future. The argument which shows a greater correlation is the one referring to employment opportunities (MI_103 better employment opportunities will increase emigration from country/region). In contrast, we observe a negative correlation on the argument about population ageing (MI_095 population ageing will reduce emigration from country/region). With regard to immigration, we observe a similar pattern as the argument on employment opportunities seems to be correlated with respondents expecting an increase in immigration in the future (MI_104 better employment opportunities in country/region will increase immigration to country/region).

4.6. Conclusions

This section of the survey has dealt with the field of international migration and its determinants with the aim to understand the future of immigration and emigration in 2050 and 2100.

This section included arguments on the drivers of emigration and immigration. We observed that the two phenomena received different agreement levels depending on the aspect of migration considered, which may reflect whether the responses concerned countries which are primarily an origin or a destination for migrants.

One of the most interesting findings of this module is that, among the demographic factors influencing migration, the arguments on population ageing received the highest agreement level for both immigration and emigration, followed by the argument indicating how the existence of a network of people encourages further migration.

Another finding is that we observe an overall rather high level of agreement with the arguments presented. The argument about wage levels is one of those which received the highest agreement and among the highest convergence.

Furthermore, results suggest that there is a good level of coherence among emigration arguments. Most argument which point to an increase in emigration are positively correlated with the choice of expected increase in emigration rates in the future. The argument that shows a greater correlation is the one referring to employment opportunities. In contrast, we observe a negative correlation for the argument about population ageing.

5. Chapter 5: Consequence of demographic change

5.1. Key messages

- The opinions of demographers align loosely with two main visions for the role of population policies in addressing global issues which we named interventionism and abstentionism.
- Interventionists, while not questioning the human rights-centered approach, advocate for restoring a more prominent role for population policy and family planning.
- Abstentionists rely on the trust of an autonomous role of development and education as forces which could bring to demographic convergence and a decrease in fertility levels. In an ideal situation, raising education would address development and ageing concerns without further need to pursue explicit fertility targets.
- Opinions on the salience of issues and the role of policies in some cases diverge based on the low or high fertility context. This divergence means that pursuing an international consensus on population policies is nowadays a more complex exercise which needs to balance different sets of priorities, perspectives and goals.
- More direct interventions are advocated by those having deeper concerns about the negative consequences of population growth on the environment and development, while less direct action is advocated by those shifting the responsibility for emissions to income and referring to the ineluctability of demographic inertia.

5.2. Introduction

With respect to the previous survey done by IIASA in 2010-2011 this edition of the global survey on demographic determinants includes a policy-oriented section with 24 statements on the implications of demographic change for the environment (9 statements) and for the economy (8 statements), and on the role of the population policies to address these implications (7 statements).[11]

This section expands the previous ones by eliciting opinions of demographers (and other stakeholders) not only on demographic determinants (fertility, mortality, migration) and their drivers but also on the wider policy context where these projections and the intrinsic uncertainties that come with them are ultimately expected to play a role.

Several statements in this section were taken integrally from key papers in the demographic literature. The selection is an attempt to summarise some of the more explicit and recent positions expressed by demographers on the role of population policies in addressing global challenges.

5.2.1. Evolution of population policies towards higher interventionism and diverging policy rationales

The UN Population Division produces periodically a comprehensive mapping of population policies for all countries in the world (UNDESA, 2023).

By looking at the time series of this database it is possible to appreciate how population policies, mostly related to fertility, have been evolving along the two parallel lines of more interventions and of a divergence of policy rationales between low and high fertility countries.[12]

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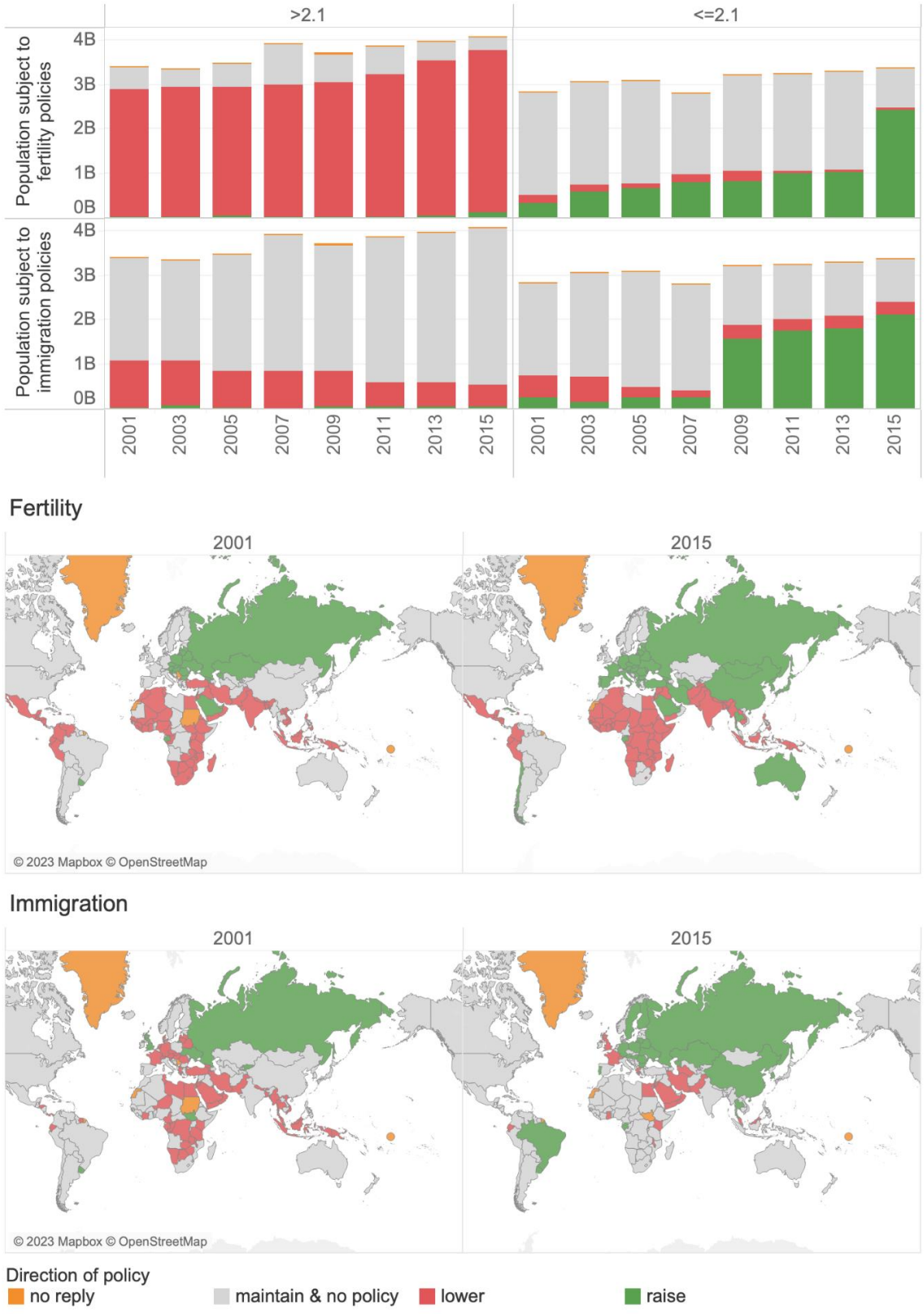
[11] Differently from the other sections of the survey, respondents were asked to express their agreement on each statement on a simplified scale of "agree", "neutral", and "disagree". The compilation of this section of the survey was compulsory. Overall, the policy section was filled in by 188 respondents and there were 4280 replies to specific statements. See Table 1 in the Annex for a detailed table of the statements.

[12] Between 1976 and 2015 the database of population policies was updated biennially through a detailed country-by-country review of national plans done by the Population Division. The 2017 revision focused on health and since 2019 the revisions have been exclusively based on surveys with national authorities with modules dedicated to Population size, growth and distribution, Fertility, family planning and reproductive health and International migration. We show data only until 2015 since the change in methodology in this year limits comparability along the time series.

Figure 20. Evolution of fertility and immigration policies across world countries (2001-2015)



Source: Global Demographic Expert Survey
Note: The bar charts on the left represent the sum of population grouped by the direction of the fertility/immigration policy in each country. The maps on the right show for the years 2001 and 2015 the direction of population policy in each country.

Figure 20 indicates that in 2015 the population in countries with a total fertility rate above the replacement level (TFR 2.1) was around 4 billion. For almost 89% of this population, the countries had in place measures to lower fertility. In the same year, the population in low fertility countries was 3.3 billion and for almost 72% of this population, countries had in place measures to increase fertility. The divergence in policy priorities across fertility levels corresponds to a geographical divergence between most of the global north, having in 2015 measures to raise fertility, and most of Africa and South East Asia, having measures to lower fertility (see maps in Figure 20).

Overall, the share of the world population affected by policy interventions, either to lower or increase fertility, increased from 50% in 2001 to 85% in 2015.[13]

In the case of immigration policies, a similar tendency for interventionism is accompanied by more openness towards immigration. These trends can be detected by observing on one side, the increase in the share of the population in low fertility countries opting to raise immigration and, on the other side, the decrease in the share of the population in countries with measures to lower immigration.

The diverging trends of population policies are well described in a book on Population policies by May and Goldstone (2022). This book highlights the challenge for modern population policies to "reconcile the macro-demographic approach with human rights considerations" after a paradigm shift from global targets and coercive population policies to individual concerns firmly established during the 1994 International Conference on Population and Development (ICPD) in Cairo.

The consensus reached in Cairo is the result of debates around population policies developing in a period between 1974 and 1994 through three major UN population conferences in Bucharest (1974), Mexico City (1984) and Cairo (1994).

A recent analysis by Coole (2021) interprets this genealogy of population policies as a process in which they were progressively "developed, contested and disavowed". According to this author, this process was leading in essence to a progressive "toxification" of the population policy discourse. One of the conclusions of this paper is that "material conditions in the twenty-first century warrant revisiting the population question". Contextualising "the emergence of late twentieth-century arguments and taboos" around population policies is indeed an attempt by Coole of moving forward the debate on population rationales and bring it more in line with current environmental sustainability challenges and new demographic trends.

Along this line, one of the statements in this section of the survey makes explicit reference to the turning point of Cairo "*PO_221 It is time to look again at the Cairo consensus and pursue a stabilisation of population for environmental and sustainable development while preserving basic human rights*". The idea here is not to re-open the discussion on the well-established principle of the human rights centered approach but rather to understand if the opinions of experts are indeed changing in the direction indicated by Coole.

Before Cairo, population policy goals were more simply inspired by the need to control excessive population growth; nowadays, when population growth is slowing down and demographic trajectories are diverging, global population policies need to balance a more complex and less clear-cut set of priorities. In the face of this complexity, the debates on old stances of excessive population growth and new stances of pronatalist policies are often dominated by ideological and political positions and a simplistic understanding of population dynamics which would definitely benefit of the contribution of experts not only limited at improving demographic projections and data, but also trying to put again demographic knowledge at the core of the policy discourse.

The remainder of this chapter is structured as follows. The first section provides the context for some of the statements included in the survey while the second section presents the results of the agreements by the experts on the single statements. In the third section we explore the differences in the agreement across fertility levels of countries. The fourth section concludes by analysing the relation between the agreements on the salience of implications from demographic changes and the interventionism and abstentionism positions in relation to the role of population policies.

[13] The large increases in the population subject to measures to increase fertility between 2013 and 2015 and to expand immigration between 2007 and 2009 can be explained by the change in policies in China.

5.3. Description of statements

5.3.1. Implications for the environment

The recognition of the fundamental role of population growth for environmental sustainability dates to the idea of a 'Malthusian trap 'which postulated an irreconcilable discrepancy between an exponential population growth and a constrained availability of food resources. The high population growth during the 70 'brought to a re-surgency of Neo-Malthusian positions such as the ones iconically represented in by the book The Population Bomb by Ehrlich and the Report of the Club of Rome. Such views are still present and are now mostly inspired by the need to take immediate action at the international level to fight climate change. [14]

One of the most synthetic and authoritative expressions of the current sustainability concerns linked to population growth is by Sir David Attenborough, "*PO_210 All our environmental problems become easier to solve with fewer people, and harder – and ultimately impossible – to solve with ever more people".* This statement is taken as leitmotif of "Population Matters", a UK-based charity that addresses population size and its effects on environmental sustainability.

In line with this concern, some demographers have highlighted as misconceptions the notion that population growth is no longer a problem and that population policies are too controversial and ineffective to succeed (Bongaarts and O'Neill 2018; O'Sullivan, 2023). As a counter-argument to these misconceptions the survey includes statements about the fundamental role of lowering fertility to reduce global emissions ("*PO_211 Small reductions of fertility can have large impacts on population growth and are an effective way to achieve a reduction in emissions.*") and the need to act on population growth and consumption also considering the challenges ahead to green our economies ("*PO_209 It will be impossible to achieve a decarbonisation of human activities in the medium term, therefore we need to act on consumption and population growth.*").

The unbalance between the bottom 50% of the world population responsible for only 16% of all emissions and the top 1% who has been responsible for 23% (Chancel 2022) lead easily to recognise that the impact on future emissions is not proportional to population growth but is ultimately depending from income and the unequal distribution of responsibilities for emissions between global North and global South ("PO_216 *More than by population size and composition, environmental impacts and emissions are determined by affluence, technology and the unequal distribution of income across and within countries.*")[15].

Besides population size there are other population characteristics such as education, changes in household and age structure and rural-urban place of living which can influence emissions either through the consumption or production channel or in interaction with income. The statement "*PO_212 Irrespective of age and education, urbanisation in low and middle-income countries is likely to increase emissions due to the positive effects on economic growth and the higher expenditures of people living in cities.*" tries to capture in particular the role of the urban/rural place of living as an additional demographic dimension to be considered when assessing the impacts of population on emissions.

Taking in considerations additional demographic characteristics allows among other things to recognise a possible increase of emissions through the consumption channel also in absence or declining population growth as expressed in the statement: "*PO_213 Declining population in high income countries will determine higher per capita emissions due to smaller household size and consumption concentrated on carbon intensive items.*"

A further argument often raised by demographers is related to a contrast between the need to act immediately to reduce emissions and the intrinsic inertia of demographic processes (*PO_217 Given demographic inertia, it is too late to act on population size to limit emissions).* Disagreement on this statement normally corresponds to the notion that demographic inertia should not be held as an excuse for not intervening in the long term.

5.3.2. Implications for the economy and societies

There can be few doubts that demographic dynamics have and will continue to have profound implications on regional, national and global economies. Beyond the simple and multiplicative effects of population size on GDP, changes in population 'composition in each country have clear macro-economic implications. These

[14] For a review of the role of population on emission see Deuster, C. et al. 2023. 'Demography and climate change'. EUR 31512 EN, Publications Office of the European Union, Luxembourg.

[15] A stress on distributional aspects linked to inequality and ageing rather than population size is a follow up of the Club of Rome report released in 2023 by Earth4All "People and Planet: 21st Century Sustainable Population Scenarios (2023) - Global Challenges Foundation". https://globalchallenges.org/library/people-and-planet-21st-century-sustainable-population-scenarios-and-possible-living-standards-within-planetary-boundaries-2023/ (September 27, 2023)

implications can be assessed looking at a purely demographic balance between population of working age and children and older persons (e.g., Old-age dependency ratios) or with more refined considerations about the profiles of labour productivity and public and private consumption versus savings over the life course (Mason, Lee, and members of the NTA Network 2022).

The divergence of demographic trends between countries implies also a shift of economic weight across the world and different set of challenges and opportunities for national economies.

Currently rapid population and youthful age structure in most low- and lower-middle-income countries of Latin America, Africa, and South Asia may boost economies through the so-called demographic dividend. However, for these benefits to materialise the provision of governance, public infrastructure, services and more in general of the key structural factors for economic development need to keep pace and generate sufficient employment opportunities for the rapidly expanding young population. In absence of these opportunities, not only there will not be a beneficial contribution from labour to reduce the dependency ratio but there is also the risk that masses of unemployed young people concentrated in cities will create political instability and unrest. The following statement captures in a rather explicit way a pessimistic view about the possibilities to reconcile rapid population growth with development 16 "PO_207 Population growth in poorest regions of the globe is an obstacle to development that makes it difficult to be optimistic about their futures." (Bongaarts 2016)

High-income and upper-middle-income face an opposite challenge of a negative demographic dividend linked to the ageing of their population. In this case a negative effect on GDP is expected from the fact that consumption of the older persons exceeds the income produced through labour. The consequences of the negative dividend are particularly worrying for the sustainability of generous welfare state, pensions and health care systems which have been established in the completely different demographic context of still expanding working age populations.

The survey contains a series of statements asking opinions on possible ways to attenuate the challenges posed by ageing through the use robotics and AI (PO_205 Contribution from increased use of robotics and AI to productivity will offset challenges linked with population ageing), increasing labour productivity (PO_204 Contribution from education to productivity will offset challenges linked with population ageing) and adaptations of the welfare systems (PO_208 Measures for the stabilization of social security and care systems could offset challenges linked with population ageing).

An often-invoked solution to face the demographic challenges posed by an ageing population is through immigration. The demographic contribution of immigration to rebalance the age structure of population is contested by several demographers who underline that the inflows of migrants would need to be extremely large and well beyond the likely acceptance by public opinion in receiving countries to have a meaningful demographic effect. In addition, demographers point to the fact that since also migrants age the positive contribution of the arrival of normally younger migrants is only temporary and would be need to be sustained in the long term with constant arrivals of new cohorts (PO_203 Increased immigration will not appreciably offset population decline, and the workforce issues posed by population ageing).

5.3.3. Interventionism vs abstentionism

The statements about the role of policies, despite not being formulated in a straight way of eliciting quantitative estimates on demographic targets and intervention thresholds (e.g., the level of fertility where it would be useful to intervene),[17] are hinting indirectly at two main positions of "interventionism" and "abstentionism" for population policies.

These positions relate, in the first place, to the question of whether there is at all a need for population policies to act on population dynamics. In second instance, they address the question of whether the interventions should focus on demographic components of fertility, migration and mortality only (strictly the scope of population policies), or given the ineluctability of demographic trajectories, should rather deal with the societal consequences of demographic change in a more adaptive and reactive way. In the third instance, they relate to the three possible levels of intervention on the determinants of demographic components: interventions on their proximate determinants (e.g., individual biological and behavioural variables), on their intermediate

16 Growth of the support ration between workers to consumers.

[17] See van Dalen and Henkens (2021) for a large survey among global demographers on the levels of fertility at which countries should intervene.

determinants (e.g., education, and household socioeconomic variables) or the contextual factors (e.g., cultural and religious norms, urbanisation and socioeconomic conditions of countries and regions).[18]

Interventionists positions are represented by the statement of Coole about the need to look again at the Cairo consensus (PO_221).

An abstentionist position is represented by the statement "*PO_222 Population policies should not pursue demographic targets; their primary goal should be to strengthen the human resource base for national and global sustainable development.*" (Lutz 2014).

Abstentionism does not necessarily mean negating the need to address the important "externalities" population change. Nor is it strictly motivated by the idea of having a population goal consistent with human rights. In fact, the paper by Lutz is clear in keeping the two levels separate and confines the scope of population policies on aggregate population trends rather than individual issues of reproductive rights and health.

The abstentionist view is rather grounded on concerns about the effectiveness of direct interventions on fertility through family planning which can be both referred to high and low fertility countries context (*PO_224 Pronatalist policies have limited impact on fertility*) on the need to intervene in the first place (*PO_220 Fertility as low as … births per woman and possibly even lower should not in itself be a matter of concern. Fertility below replacement and modest population decline favour higher material standards of living.*) (Lee and Mason 2014) and more importantly on the recognition of the fundamental role of education as an additional demographic dimension.

Incorporating education in the projections and seeing increases in human capital as part of demographic goal have the double advantage of pursuing an automatic population growth stabilisation mechanism (*PO_223 Education and urbanization will autonomously lead to a reduction in fertility therefore there is limited need for family planning policies.*) while addressing some of the most serious consequences of demographic change for development and ageing societies as expressed in some statement on the implication of demographic seen before.

5.4. Results of the survey

5.4.1. Agreement with specific statements

Figure 21 gives an overview of the average agreement and of the level of convergence recorded for each of the 24 statements in the policy section of the survey. On the y-axis, the agreement is expressed as simple average of the replies after converting the discrete values of "agree", "disagree" and "neutral" into a continuous scale between -2 and 2[19]. On the x-axis, the convergence is expressed as standard deviation.

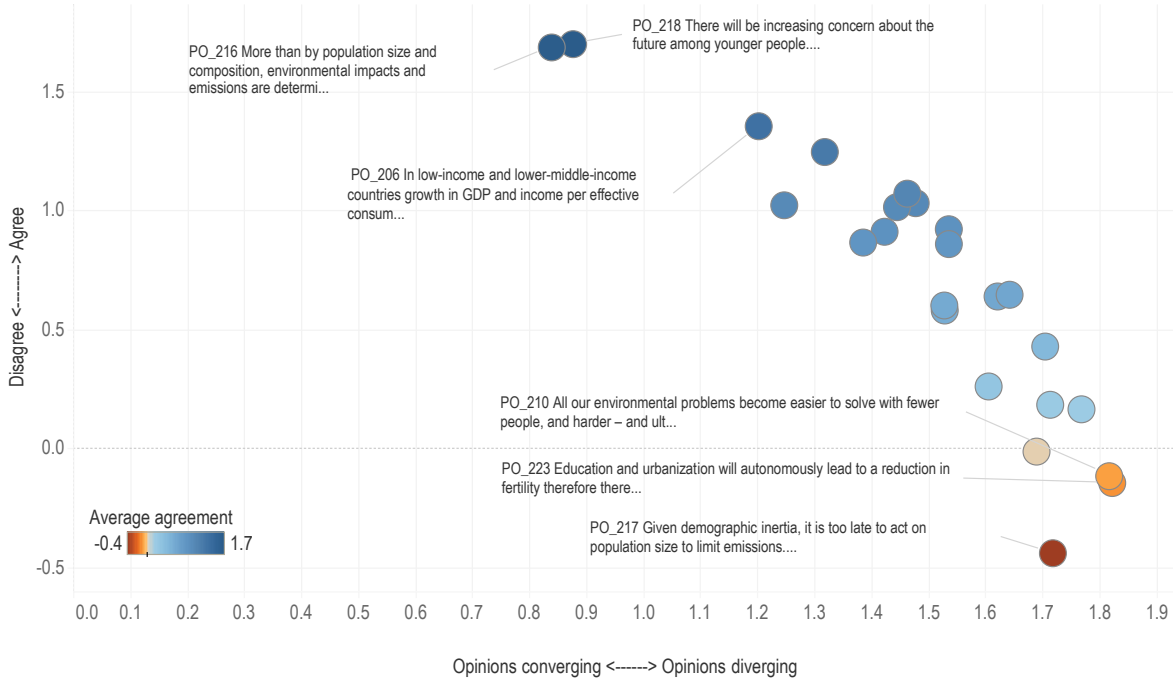
On average, the policy section recorded a higher level of agreement in respect of the other sections of the survey. In addition, in this section it is possible to notice a clearer negative correlation between agreement and convergence, depicted by the diagonal line in the figure.

This negative correlation entails that statements which recorded high agreement were also the ones where most of the opinions converged (top left). At the same time, on the bottom right of the chart, there are statements where disagreement was accompanied by strong divergence in opinions.

The negative correlation may stem from a formulation of the statements which prompted either a convergence in the agreement or a polarisation with the emergence of both positive and negative opinions, whilst there were few statements which recorded unanimously disagreement by the experts (positioned in the left bottom area of the figure).

[18] For a definition and levels of interventions of population policy see (May 2012) and in relation to proximate determinants of fertility see Bongaarts (1978).
[19] Note that agreement for this section of the survey was structured on a simpler scale of 3 levels rather 5 levels. Agree was converted in 2 and disagree in -2 to allow comparison of means and standard deviations.

Figure 21. Agreement and convergence of opinions



Source: Global Demographic Expert Survey
Note: Each symbol represents a statement. The x-axis represents the standard deviation of the responses and the y-axis the average. The responses have been converted in a continuous measure: -2 (disagree), 0 (neutral) and 2 (agree). See Figure 21 and Table 1 in the Annex for the full text of the statements.

The highest agreement and convergence were recorded by the statements at the top left side of the figure about the impacts on emissions from income inequality, GDP and income (PO_216, PO_206), and about the relevance of implications of demographic change for younger generations (PO_218).

The three most polarising and disagreed statements (bottom right) were about the role of education and urbanisation as autonomous forces for population decline (PO_223), the negative effect of population growth on the environment (PO_210) and the pessimism about the usefulness to intervene on population growth to limit emissions given demographic inertia (PO_217).

The lack of agreement on the statements PO_223 and PO_217 seem to support a more proactive role for population policies to contrast climate change. At the same time, most demographers recognise a predominant role of income on future emissions and not all experts agree with the strong focus on population growth expressed in the quote of Sir David Attenborough (PO_210).

Figure 22 provides a more detailed representation of the share replies for each of the arguments grouped the three sections of implications for the environment, the economy and the role of population policy.

In the economy section, the highest shares of agreement were recorded by the statements expressing the need to seek a stabilisation of welfare and health care system to contrast the effect of ageing (PO_208, 72% of agreement) and pointing on the challenges for the younger generations (PO_218, 88% of agreement). The highest disagreement was expressed on the statement giving a pessimist position on the impact from population growth on development (PO_207, 28% of disagreement).

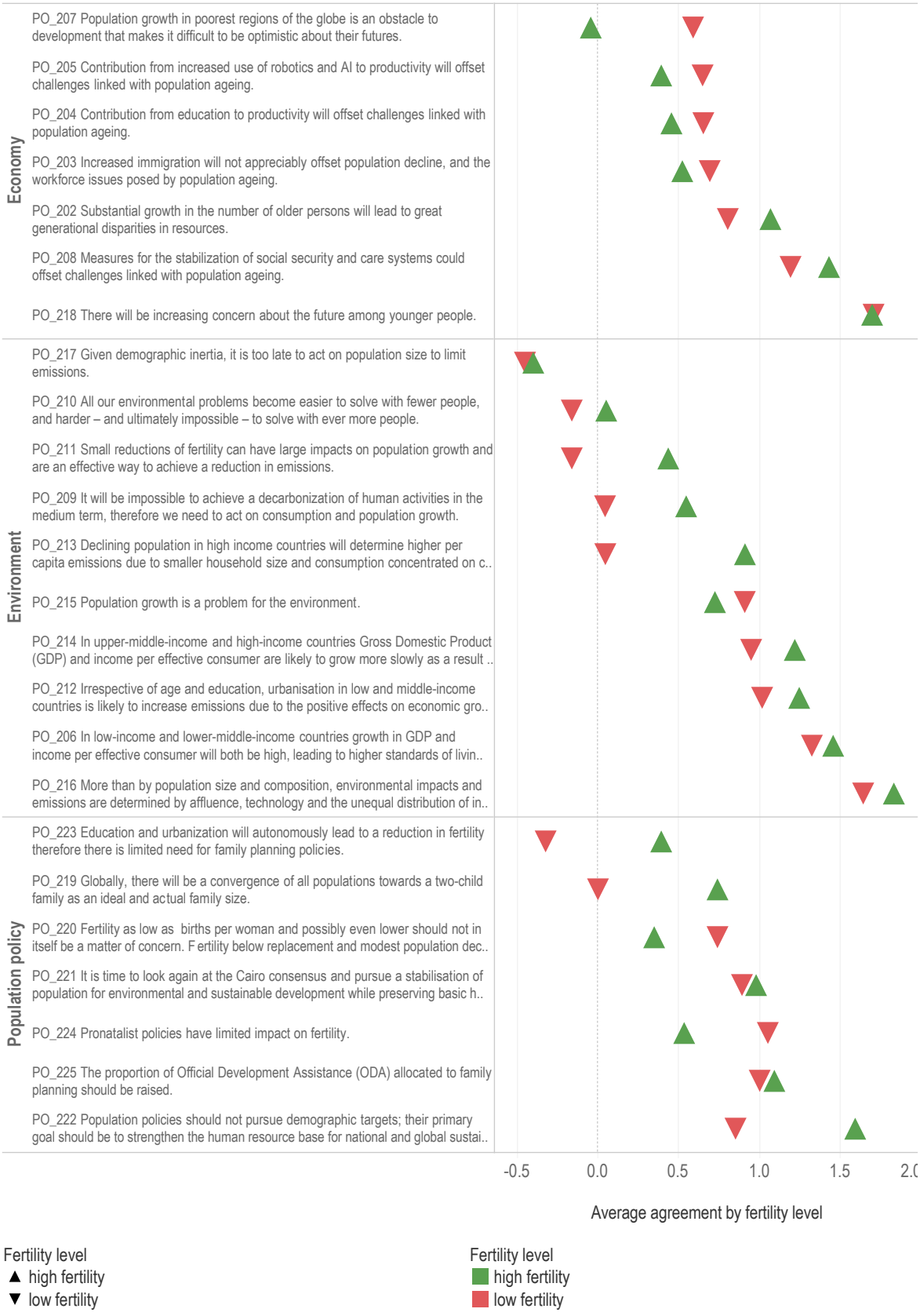
In the environment section, strong agreement was recorded by the statements underlining the prominent role on income rather than population for future emissions (PO_216, 87% of agreement and PO_206, 74% of agreement). The strongest disagreement was recorded on the issue of demographic inertia as reason for no interventions in relation to emissions (PO_217, 50% disagreement).

In the policy section, the strongest agreement was with the statement stressing need to target population policy on the goals of sustainable development and reinforcement of human resource base rather than pursuing demographic targets (PO_222, 67% of agreement).

Figure 22. Degree of agreement with policy statements

Source: Global Demographic Expert Survey
Note: Statements are sorted in increasing order of agreement.

Figure 23. Differences in agreement between estimates for countries with a high- or low- fertility context



Source: Global Demographic Expert Survey

Note: The statements in descending order of overall agreement within each group.

The statement about the prominent role of education and urbanisation as autonomous forces for fertility reductions, recorded a lower level of consensus and resulted as one of the most polarising with almost equal shares of agreement and disagreement (PO_223, 38% agreement and 44% disagreement).

5.4.2. Differences in the statements between high and low fertility contexts

Figure 23 shows the differences in agreement on the policy statements across fertility levels. The idea of this analysis is to explore more in detail possible contextual drivers[20] of the difference in opinions and test whether the salience of global issues linked to demography and rationales for population policies are indeed diverging according to demographic trajectories as indicated in the introduction.

As already emerging in Figure 21, there is a tendency in the statements to converge with the increase in the overall agreement. A notable exception to this is the statement about demographic inertia (PO_217) which is equally disagreed for low and high fertility countries.

The statements where high fertility countries agree more than low fertility countries are about the convergence toward low fertility levels (PO_213), not pursuing demographic targets in population policies (PO_222), foreseeing an increase in emission in high income also in the presence of declining population (PO_219) and the effect of education in lowering fertility (PO_223).

On the contrary low fertility countries agree more with respect to high fertility countries in relation to the statements about the negative impacts of population growth on development in poor countries (PO_207) and the limited impact of pronatalist policies (PO_224).

Figure 24. Correlation between responses on the implications from population change on the environment and the economy (columns) on the role of policies (rows)

Source: Global Demographic Expert Survey

It is interesting to observe in several cases a reciprocal pessimistic view on issues of salience between the two groups of fertility. Low fertility countries are more pessimistic on the convergence of demographic trajectories in high fertility countries and stress more the negative consequence of population growth on development (PO_207). On the contrary high fertility countries express more scepticism on the possibilities of contrasting ageing through AI and education and recognize the need to have contributions from both lowering consumption and fertility to address environmental challenges (PO_211, PO_210).

[20] It is worth noting that both the country/region attribute and fertility levels are not referring to residence or origin of the respondent but the ones for which the expert decided to provide answer and are intended therefore to contextual attributes rather than personal attributes.

5.4.3. Relation between interventionism and concerns about the implications of population change

The final analysis in Figure 24 presents some of the most relevant correlations between the statements about the implications of demographic change for the environment and the economy (columns) and the role of population policies (rows). These correlations are in general not very high. However, what is more interesting to observe is how the signs of the correlations change when shifting from interventionist (PO_222 and PO_221) to abstentionist (PO_223) positions.

The two statements expressing concerns about the environmental consequences of population growth (PO_210) and the negative impacts on development (PO_207) are positively correlated with the interventionism statement about the need to look again at the Cairo consensus (PO_221). At the same time, they are negatively correlated with the more abstentionist positions related to education and avoiding demographic targets (PO_223 and PO_222).

These abstentionist statements are rather positively correlated with the statement shifting the relevance for emissions from demography to income.

Overall, the matrix of correlation seems to support the hypothesis that the push towards interventionism by population policies can be traced back on the perceived relevance of demographic change for environmental sustainability and economic development in poorest regions of the world.

5.5. Conclusions

This section of the survey has been added to the three sections dealing with the determinants of demographic change to raise awareness among policy makers on the relevance of demographic change for key global environmental and economic issues.

Although many experts do not nicely fit in either category, it is possible to loosely identify from some of their replies positions that broadly reflect either interventionism or abstentionism.

Interventionist positions advocate for reestablishing, after a “disavowal” reached in Cairo, a more prominent role for population policy. Based on a human rights-centred approach, these positions see still a fundamental role for family planning in fertility decline. They also see the need to address the global consequences of population change and the connected pressing challenges posed by climate change and environmental sustainability.

Abstentionists rely on the trust of an autonomous role of development and education as forces, which could lead to demographic convergence and a decrease in fertility levels. With positive secondary effects, raising education in developing countries would address development concerns while producing population stabilisation. In the case of low fertility countries, education and an expansion of the human capital base would be able to at least partly attenuate through higher labour productivity the issue of ageing and shrinking labour force, rather than pursuing any policy aimed at increasing or decreasing fertility or migration at predefined targets.

The statements in this section recorded both strong agreement and polarised views, with equal share of agreement and disagreement and rare cases of consistent disagreement. This seems to indicate that the selection of the statements from the literature, although done on an ad hoc basic and not through a systematic review, captured mainstream and well-known arguments by demographers.

One of the most interesting findings emerging from the analysis is that opinions on the salience of issues and role of policies in some cases diverge based on the low or high fertility context. It is also interesting to observe the reciprocal views for statement of relevance for the other part of the world. The divergence of perspectives means that pursuing an international consensus on population policies is nowadays a more complex exercise which needs to balance different sets of priorities and goals.

Another finding is that the role of policy is correlated to the perceived salience of the issues. More interventions are advocated by those having more concerns about the negative consequences from population growth on the environment and on the development, while a moderated position is advocated by those shifting the responsibility for emissions to income and referring to the ineluctability of demographic inertia.

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Annex

Table 1 *Complete list of arguments and their groupings by major factors in the modules of the Global Expert Survey*

Low fertility

1. Cultural and social forces in fertility ideas, norms and desires

FL_051 Voluntary childlessness has spread and is increasingly becoming socially accepted, and it is likely to contribute to lower fertility in the country/region.

FL_052 The share of population groups with larger families will increase and, in turn, will probably contribute to a rise in fertility in the country/region.

FL_053 Religious views on family and reproduction will gain importance. This should likely contribute to increasing fertility.

FL_054 Climate change will gain importance in the way we think about family and reproduction. This should likely contribute to lower fertility.

FL_055 Young people will be increasingly preoccupied with the future likely resulting in lower fertility.

FL_056 The interest of young adults in intimate relations will diminish, likely contributing to lower fertility.

FL_057 Births outside of marriage will increase and, in turn, likely contribute to higher fertility.

2. Partnerships, living arrangements, and gender differences

FL_081 Men and women will increasingly share the burden of housework and childcare. This is likely to contribute to a rise in fertility.

FL_083 The availability of grandparents for childcare and family care will decline. This is likely to contribute to a decline in fertility.

FL_074 People are increasingly unable to find the right partner to form a family, in particular for highly educated women. This is likely to contribute to a decline in fertility.

FL_075 People will increasingly pursue lifestyles and activities not compatible with parenthood. This is likely to contribute to a decline in fertility.

FL_076 Marriage will further decline and will become a minority experience. This is likely to contribute to a decline in fertility.

FL_077 Partnership dissolution and "re-partnering" will become yet more common. This is likely to contribute to a decline in fertility.

FL_078 Women will achieve complete equality with men with respect to their education, employment career, and income. This is likely to contribute to a rise in fertility.

FL_079 Adults in their 20s and even 30s will spend ever longer periods of life living with their parents. This is likely to contribute to a decline in fertility.

FL_080 Diversity of gender relations and alternative family models will increase, likely contributing to lower fertility.

3. Role of policies (in this case, "Government "entails national government unless stated otherwise)

FL_084 Governments will raise child subsidies and tax benefits or introduce birth bonuses, with the aim of increasing fertility.

FL_086 Governments will provide universal nursery/kindergarden access (subsidized or free), with the aim of increasing fertility.

FL_087 Provision of affordable housing for families with young children will become an important part of social policies, with the aim of increasing fertility.

FL_088 New policies will allow young parents to significantly reduce their working hours for several years with some compensation of income, with the aim of increasing fertility.

FL_089 Mothers will be better supported when returning to work when the children are small, with the aim of increasing fertility.

FL_090 Governments will cut back on family support when economic conditions worsen. This will likely contribute to a decline in fertility.

FL_091 As populations age, government funds will become increasingly directed toward older people, rather than the young. This will likely contribute to a decline in fertility.

FL_092 Governments will increasingly pursue pronatalist policies aiming to increase fertility, often at the cost of limiting sexual and reproductive rights.

FL_093 Governments will support women who wish to have children without a partner (single mothers by choice). This will likely contribute to an increase in fertility.

4. Employment and economy

FL_062 Employers will put more pressure on their employees in terms of higher working hours and more work commitments. This will likely contribute to lower fertility.

FL_064 Work practices will become more flexible (work from home, flexi time, part-time options). This will likely contribute to increase fertility.

FL_065 Geographical mobility, especially work-related, will increase. This will likely contribute to lower fertility.

FL_066 Immigration rates to low-fertility countries from high-fertility countries will remain high. This will likely contribute to an increase in fertility in country/region.

FL_067 Continuing economic uncertainty will make individual life-course planning ever more uncertain. This will likely contribute to lower fertility.

FL_068 Informal childcare will shift from grandparents to paid domestic workers. This will likely contribute to lower fertility.

FL_069 Cities will become more child friendly. This will likely contribute to an increase in fertility.

FL_070 Young adults will experience stagnating or declining income (e.g., due to unemployment and job instability), which will not be sufficient to start a family. This will likely contribute to lower fertility.

FL_071 Rising housing price will negatively impact young people's preferences for family formation, and likely contribute to a decline in fertility.

FL_072 Transnational employment or multiple employment will be more and more frequent. This will likely contribute to lower fertility.

FL_073 Income inequality will increase, likely contributing to lower fertility.

5. Biomedical and the timing of parenthood

FL_043 Declining sperm counts/quality will lead to a rise in male-factor infertility.

FL_045 Delayed parenthood will become more common, likely contributing to a decline in fertility.

FL_046 Having children below age 25 will become rare, likely contributing to a decline in fertility.

FL_047 The broad availability and use of efficient contraception, including post-coital methods, will make mistimed and unintended pregnancies rare. This will likely contribute to lower fertility.

FL_048 Induced abortion will be increasingly used. This will likely contribute to a decline in fertility.

FL_049 The technology and availability of Assisted Reproductive Techniques (ART) including egg freezing, will continue to improve and become more affordable, enabling more women to become mothers and achieving a desired number of children. This will likely contribute to an increase in fertility.

6. Education

FL_058 People will spend ever more years of their young adult life enrolled in education and professional training on the job. This will likely contribute to a decline in fertility.

FL_060 Better educated women will tend to have more children even while pursuing their professional careers. This will likely contribute to an increase in fertility.

FL_061 The majority of people will have access to tertiary education. This will likely contribute to a decline in fertility.

High fertility

1. Cultural change in ideal family size

FH_001 Decisions about family size will increasingly be made by couples themselves, rather than by the networks around them (extended family, community leaders, etc.). This will likely contribute to a decline in fertility.

FH_002 Religious views on family and reproduction will play an increasingly important role in the decision to have children. This will likely contribute to higher fertility.

FH_003 The government will promote the idea of small family size. This will likely contribute to lower fertility.

FH_004 There will be broader acceptance towards modern methods of contraception. This will likely contribute to lower fertility.

FH_005 Childlessness will become socially acceptable. This will likely contribute to lower fertility.

FH_006 Educational differentials in desired family size will diminish. This will likely contribute to lower fertility.

FH_007 More people will move to urban centers. This will likely contribute to lower fertility.

FH_008 Sex-selective abortions will be less common. This will likely contribute to higher fertility.

2. Health and child survival

FH_018 Adolescent marriage and pregnancy will become less frequent. This will likely contribute to lower fertility.

FH_019 There will be increasing access to healthcare for mothers and children. This will likely contribute to lower fertility.

FH_020 Parents will expect all children to survive to adulthood. This will likely contribute to lower fertility.

FH_021 Birth spacing will become more common. This will likely contribute to lower fertility.

3. Status of women and family in society

FH_034 Marriage arranged by parents or relatives will lose ground. This will likely contribute to lower fertility.

FH_035 Female educational attainment will increase. This will likely contribute to lower fertility.

FH_036 Male partners will become more supportive of modern contraceptive use. This will likely contribute to lower fertility.

FH_037 The age at first marriage will continue to increase. This will likely contribute to lower fertility.

FH_038 The participation of women in the labour force will increase. This will likely contribute to lower fertility.

FH_039 More women will decide to stay unmarried. This will likely contribute to lower fertility.

FH_040 Women will increasingly be able to decide on their own about using contraceptives. This will likely contribute to lower fertility.

FH_041 The proportion of female heads of household will increase. This will likely contribute to lower fertility.

FH_042 Economic security at old age will not be a reason for women to marry. This will likely contribute to lower fertility.

4. Reproductive Health

FH_024 The availability of modern family planning services will significantly increase. This will likely contribute to lower fertility.

FH_025 Convenient modern contraceptives without side effects will be developed and become broadly available. This will likely contribute to lower fertility.

FH_026 Most births will occur in hospitals, increasing the chance of survival for mothers and new-borns. This will likely contribute to an increase in fertility.

FH_027 More educated women will find better access to reproductive health services. This will likely contribute to lower fertility.

FH_028 Abortion will be more widely practiced and accepted than today. This will likely contribute to lower fertility.

FH_029 Modern contraception will be banned for religious, political, or other reasons. This will likely contribute to higher fertility.

FH_030 There will be increased support from faith-based communities for reproductive health services, likely contributing to lower fertility.

FH_031 Educational differentials in realized fertility will diminish. This will likely contribute to lower fertility.

FH_032 The technology and availability of Assisted Reproductive Techniques (ART) will continue to improve and become more affordable, allowing more women of advanced childbearing age to become mothers. This will likely contribute to higher fertility.

5. Economic costs and benefits

FH_010 Pension funds and social security systems will replace family support in old age. This will likely contribute to lower fertility.

FH_011 Parents put increasing value on good education of their children. This will likely contribute to lower fertility.

FH_012 Mothers will increasingly return to paid employment due to economic circumstances even when their children are small. This will likely contribute to lower fertility.

FH_013 The cost of rising children in urban setting will increase. This will likely contribute to lower fertility.

FH_016 The gap in access to education of boys and girls will decrease. This will likely contribute to lower fertility.

FH_014 The prevalence of child labour will decline. This will likely contribute to lower fertility.

FH_015 Education expansion will be pursued following the Sustainable Development Goals. This will likely contribute to lower fertility.

High mortality

1. Changes in biomedical technology

MH_140 Improvements in medical technology will contribute to declining mortality.

MH_141 Medical care will improve due to therapeutic and diagnostic devices developed specifically for low resource areas, likely contributing to lower mortality.

MH_142 There will be little financial incentive for private pharmaceutical companies to invest in research and development (R&D) for new treatments for neglected diseases, likely contributing to higher mortality.

MH_143 Investing in education and in-country research will favor in-country development of appropriate biomedical technology, likely contributing to lower mortality.

2. Effectiveness of health care systems

MH_145 Low-cost access to essential medicines for broad segments of the population will improve. This will likely contribute to a decline in mortality.

MH_146 Increasing user fees for medical services will restrict access to effective and timely treatment. This will likely contribute to an increase in mortality.

MH_147 Basic public health and nutrition interventions (e.g., immunization, breastfeeding, vitamin A supplementation and safe drinking water) will be expanded to cover more children under the age of 5. This will likely contribute to a decline in mortality.

MH_148 Coverage of inexpensive interventions against diarrhoea, pneumonia and malaria will be expanded. This will likely contribute to a decline in mortality.

MH_149 Delivery of reproductive health services, including antenatal care services and family planning programs, will be extended. This will likely contribute to a decline in mortality.

MH_150 Competing demands will reduce government spending for health care systems. This will likely contribute to an increase in mortality.

MH_151 Health and social services in urban areas will not keep pace with urban population growth. This will likely contribute to an increase in mortality.

MH_152 There will be increasing access to improved sanitation for young girls and women. This will likely contribute to lower mortality.

3. Behavioural changes related to health

MH_131 Sedentary lifestyles and changes in diet leading to chronic disease risk will increase. This will likely contribute to an increase in mortality.

MH_132 Tobacco consumption will eventually decrease for men and women. This will likely contribute to a decline in mortality.

MH_133 Substance abuse (alcohol and drugs) will increase. This will likely contribute to an increase in mortality.

MH_134 Increased awareness of the importance of physical activity will lead people to exercise more, likely contributing to lower mortality.

MH_134 Increased awareness of the importance of nutrition will lead people to adopt healthier diets, likely contributing to lower mortality.

MH_136 Investments in education will lead people toward more health-inducing behaviours, likely contributing to lower mortality.

MH_137 Mortality differentials by level of education will diminish, likely contributing to lower mortality.

MH_138 The diet will be more meat-based and more heavily reliant on over-processed and sugary food, leading to higher rates of cardiovascular disease and cancer, among others. This will likely contribute to an increase in mortality.

4. Infectious diseases

MH_163 There will be an increase in new infectious diseases and re-emergence of past infectious diseases. This will likely contribute to an increase in mortality.

MH_164 There will be increasing drug resistance to known infectious diseases, likely contributing to an increase in mortality.

MH_165 Increasing standard of living, hygiene and nutrition will improve host-resistance to communicable diseases. This will likely contribute to a decline in mortality.

MH_166 Investments in education will increase capability of early detection and control to contain the spread and impact of new infectious diseases, likely contributing to a decline in mortality.

5. Environmental changes, hazards and wars

MH_154 The frequency and intensity of natural hazards (such as droughts, floods, and severe storms) will increase. This will likely contribute to an increase in mortality.

MH_155 Climate change will increase the risk of infectious diseases, likely contributing to an increase in mortality.

MH_156 Climate change will contribute to an expansion of the malaria zone, likely contributing to an increase in mortality.

MH_157 Indoor air pollution due to utilization of solid fuels, including biomass (wood, dung, and crop residues) and coal will decrease, likely contributing to a drop in mortality.

MH_158 Chemical and nuclear contamination will be a major health threat in the future, likely contributing to an increase in mortality.

MH_159 Better education will contribute to decreasing vulnerability to climate change. This will likely contribute to lower mortality.

MH_160 Increased social inequality will lead to higher prevalence of poverty, distrust, violence, and crime. This will likely contribute to higher mortality.

MH_161 Increased pollution will increase mortality.

Low mortality

1. Changes in bio-medical technology

1.1 Increased understanding of bio-medical ageing processes will allow us to develop effective anti-ageing strategies. This will likely contribute to lower mortality.

1.2 Medical breakthroughs will lead to a substantial decline in mortality from cancers and other life-threatening diseases.

1.3 Unintended adverse consequences of new bio-medical technologies will outweigh their benefits. This will likely contribute to higher mortality.

1.4 The effects of advances in biomedicine will be restricted by a biological limit of human life span. This will likely contribute to limiting the decline in mortality.

2. Effectiveness of health care systems

ML_179 The cost of new treatments will be prohibitive to large segments of the population. This will likely contribute to limiting the decline in mortality.

ML_186 There will be some very effective and easily affordable new treatments. This will likely contribute to lowering mortality.

ML_187 The growing number of older people means that access to treatment will be limited and waiting times will be longer, likely contributing to an increase in mortality.

ML_188 Society will be able and willing to afford expensive new treatments. This will likely contribute to lowering mortality.

ML_189 Better and faster medical and health information dissemination will improve longevity.

Ml_190 Changes in living conditions will improve health of the population, above all older people, likely contributing to a decline in mortality.

ML_191 Home- and community-based health care services will be more available and popular improving the quality of life for older people, likely contributing to a decline in mortality.

3. Behavioural changes related to health

ML_169 Smoking prevalence will decline for both men and women, likely contributing to a decline in mortality.

ML_170 Substance abuse (alcohol and drugs) will lead to more premature mortality and accidents.

ML_171 Increased awareness of the importance of physical activity will lead people to exercise more, likely contributing to a decline in mortality.

ML_172 Increased awareness of the importance of nutrition will lead people to adopt healthier diets, likely contributing to a decline in mortality.

ML_173 Increased stress levels will likely contribute to increased morbidity and increased mortality.

ML_174 Increasing mental and social activities at old age will increase longevity.

ML_175 Mortality differentials by level of education will diminish, likely contributing to a decline in mortality.

Ml_176 Men's life expectancy will catch up with women's, likely contributing to a further decline in mortality.

ML_177 Increasing social isolation and loneliness will contribute to lower life span.

ML_178 Mortality difference between the rich and the poor will increase, likely contributing to an increase in mortality.

4. Possible new infectious diseases and resurgence of old diseases

ML_199 There will be a growth in infectious diseases, leading to a rise in overall mortality.

ML_200 Increasing drug resistance to known infectious diseases will likley contribute to increasing mortality.

ML_201 Increased capability of early detection and control will help to contain the spread and impact of new infectious diseases, likely contributing to lower mortality.

5. Environmental change, natural hazards and wars (as affecting mortality in the chosen country)

ML_193 Increased frequency and intensity of natural hazards (such as flooding, strong storms, and drought, and cold spells) will increase mortality.

ML_194 Climate change will lead to the spread of malaria and other infectious diseases, likely contributing to higher mortality.

ML_195 More intensive heat waves during summer will increase mortality among older people and frail populations.

ML_196 Less extreme cold spells during winter will decrease mortality among older and frail populations.

ML_197 Increased pollution will increase mortality.

Migration

1. Economic development

MI_103 Emigration: better employment opportunities abroad will increase emigration from country/region.

MI_104 Immigration: Better employment opportunities in country/region will increase immigration to country/region.

MI_105 Emigration: Higher wage levels abroad will increase emigration.

MI_106 Immigration: Higher wage levels in country/region will increase immigration.

MI_107 Emigration: Remote work will become more widespread and lead to more people leaving country/region to work abroad.

MI_108 Immigration: Remote work will continue to expand and encourage people to move to country/region while keeping their place of work abroad.

MI_109 Immigration: The quality of university education in country/region will increase the number of foreign students coming to study in country/region.

MI_110 Emigration: The quality of university education abroad will increase emigration of students to study in other countries/regions.

MI_111 Emigration: Poor social support systems in country/region will increase emigration.

MI_114 Immigration: Generous social support systems in country/region will increase immigration.

MI_112 Emigration: Access to strong health care and educational systems abroad will foster emigration from country/region.

MI_113 Immigration: Access to strong health care and educational systems in country/region will foster immigration.

2. Climate change

MI_123 Immigration: Sea-level rise will drive political instability and intensify migration flows into country/region.

MI_124 Emigration: Sea-level rise will drive political instability and increase the number of people departing from country/region.

MI_125 Emigration: Climate change will increase emigration from country/region.

MI_126 Immigration: Climate change will increase immigration to country/region.

MI_127 Emigration: Resources constraints caused by climate change will affect capabilities to migrate and reduce the emigration from country/region.

MI_128 Immigration: Resources constraints caused by climate change will affect capabilities to migrate and will reduce immigration to country/region.

3. Demographic factors

MI_095 Emigration: Population ageing will reduce emigration from country/region.

MI_096 Immigration: Population ageing in country/region will increase the demand for immigrant workers.

MI_097 Emigration: The propensity to move abroad among the working age group will be particularly high in country/region because of its youthful age structure.

MI_098 Immigration: The propensity to immigrate to country/region among the working age group will be particularly low because of its youthful age structure.

Mi_099 Emigration: Emigration from country/region will increase, but not increase permanent emigration due to higher return rates.

MI_100 Immigration: Immigration to country/region will increase, but not increase permanent immigration due to higher return rates.

MI_101 Emigration: Having a community of people who speak the same language and share the same culture abroad will increase the number of people leaving from country/region.

MI_102 Immigration: Having a community of people who speak the same language and share the same culture in country/region will increase the number of people arriving into country/region.

4. Migration regimes and policy

MI_116 Emigration: Destination countries will strengthen border controls and tighten immigration policies thus reducing emigration from country/region.

MI_117 Immigration: Strengthened border controls and tighten immigration policies in country/region will decrease immigration.

MI_118 Emigration: The tightening of family reunification policies in destination countries will limit the legal prospects of family migration thus decreasing emigration.

MI_119 Immigration: The tightening of family reunification policies in country/region will limit the legal prospects of family migration thus decreasing immigration.

MI_120 Emigration: Labour migration schemes abroad will increase emigration from country/region.

MI_121 Immigration: Labour migration schemes in country/region will increase immigration to country/region.

Consequences of demographic change

PO_215 Population growth is a problem for the environment.

PO_218 There will be increasing concern about the future among younger people.

PO_216 More than by population size and composition, environmental impacts and emissions are determined by affluence, technology and the unequal distribution of income across and within countries.

PO_213 Declining population in high income countries will determine higher per capita emissions due to smaller household size and consumption concentrated on carbon intensive items.

PO_214 In upper-middle-income and high-income countries Gross Domestic Product (GDP) and income per effective consumer are likely to grow more slowly as a result of demographic change.

PO_206 In low-income and lower-middle-income countries growth in GDP and income per effective consumer will both be high, leading to higher standards of living as conventionally measured, but also to increased environmental strains associated with growth in population and GDP.

PO_219 Globally, there will be a convergence of all populations towards a two-child family as an ideal and actual family size.

PO_217 Given demographic inertia, it is too late to act on population size to limit emissions.

PO_209 It will be impossible to achieve a decarbonisation of human activities in the medium term, therefore we need to act on consumption and population growth.

PO_210 All our environmental problems become easier to solve with fewer people, and harder – and ultimately impossible – to solve with ever more people.

Po_211 Small reductions of fertility can have large impacts on population growth and are an effective way to achieve a reduction in emissions.

PO_212 Irrespective of age and education, urbanisation in low and middle-income countries is likely to increase emissions due to the positive effects on economic growth and the higher expenditures of people living in cities.

PO_202 Substantial growth in the number of older persons will lead to great generational disparities in resources.

PO_203 Increased immigration will not appreciably offset population decline, and the workforce issues posed by population ageing.

PO_204 Contribution from education to productivity will offset challenges linked with population ageing.

PO_205 Contribution from increased use of robotics and AI to productivity will offset challenges linked with population ageing.

PO_220 Fertility as low as 1.6 births per woman and possibly even lower should not in itself be a matter of concern. Fertility below replacement and modest population decline favor higher material standards of living.

PO_207 Population growth in poorest regions of the globe is an obstacle to development that makes it difficult to be optimistic about their futures.

PO_221 It is time to look again at the Cairo consensus and pursue a stabilisation of population for environmental and sustainable development while preserving basic human rights.

PO_222 Population policies should not pursue demographic targets; their primary goal should be to strengthen the human resource base for national and global sustainable development.

PO_223 Education and urbanization will autonomously lead to a reduction in fertility therefore there is limited need for family planning policies.

PO_224 Pronatalist policies have limited impact on fertility.

PO_225 The proportion of Official Development Assistance (ODA) allocated to family planning should be raised.

PO_208 Measures for the stabilization of social security and care systems could offset challenges linked with population ageing.

Table 2 Sensitivity analysis: Change in the number of respondents by threshold level

Number of survey respondents	**254**
Number of cases if threshold at 20%:	251
Number of cases if threshold at 30%:	249
Number of cases if threshold at 40%:	245
Number of cases if threshold at 50%:	237

Table 3 Profile of respondents and country responses

Total respondents: 237					
Affiliation:		**Country of residence:**		**Country of birth:**	
Academia	102	Argentina	1	Argentina	1
EU policymaker	5	Australia	8	Australia	5
Government, Ministry, Agency	16	Austria	12	Austria	1
International organisation	11	Bangladesh	2	Bangladesh	2
NGO(non-governmental organisation)	7	Belgium	9	Belgium	3
Other	3	Brazil	1	Benin	1
Research institution	37	Cameroon	3	Brazil	1
Blank	56	Canada	1	Bulgaria	1
		China	3	Cameroon	2
Age of respondents (years):		Croatia	3	Canada	1
25-44	69	Czechia	1	Chad	1

45-64	81	Cote d'Ivoire	2	China	9
Above 65	29	Estonia	1	Colombia	2
Below 25	2	Finland	2	Croatia	3
Blank	56	France	9	Czechia	4
		Germany	10	Cote d'Ivoire	2
Gender:		Guinea	1	Democratic Republic of the Congo	1
Female	72	Hong Kong	1	Egypt	1
Male	107	India	6	Estonia	1
Other	1	Indonesia	1	France	8
Blank	57	Israel	1	Germany	6
		Italy	9	Guatemala	1
		Japan	1	Guinea	1
		Kenya	2	Hong Kong	1
		Latvia	1	Hungary	2
		Malaysia	2	India	7
		Malta	1	Indonesia	2
		Mexico	3	Iran	1
		Morocco	2	Israel	1
		Nepal	3	Italy	11
		Netherlands	8	Japan	2
		New Caledonia	1	Kenya	2

		New Zealand	1	Latvia	1
		Nigeria	4	Malaysia	2
		Norway	4	Malta	1
		Pakistan	1	Mexico	2
		Poland	1	Morocco	1
		Romania	1	Nepal	3
		Russia	2	Netherlands	8
		Singapore	1	New Zealand	1
		Slovakia	1	Nigeria	4
		South Africa	1	Norway	2
		South Korea	1	Pakistan	2
		Spain	2	Poland	6
		Sri Lanka	1	Portugal	1
		Sweden	2	Romania	1
		Switzerland	1	Russia	3
		The Gambia	1	Singapore	1
		Uganda	1	Slovakia	1
		United Arab Emirates	1	South Africa	1
		United Kingdom	6	South Korea	2
		United States	33	Spain	2
		Uruguay	1	Sri Lanka	1

		Blank	59	Sweden	1
				Switzerland	3
				The Gambia	1
				Turkiye	2
				Uganda	1
				United Kingdom	6
				United States	22
				Uruguay	1
				Venezuela	1
				Blank	66

Table 4 Number of countries and regions covered by experts' responses

Regions:					
Australia/New Zealand	6	Northern Africa	3	Southern Europe	6
Central Africa	4	Northern America	11	South America	6
Central Asia	2	Northern Europe	7	Western Africa	12
Eastern Africa	7	South-Eastern Asia	5	Western Asia	1
Eastern Asia	10	Southern Africa	2	Western Europe	28
Eastern Europe	4	Southern Asia	4		
Countries:					
Algeria	1	Ghana	1	Netherlands	3
Argentina	1	Guatemala	1	Nigeria	5
Australia	3	Guinea	1	Pakistan	1
Bangladesh	1	Hungary	1	Poland	4
Brazil	1	India	8	Romania	1

Burkina Faso	1	Indonesia	3	Russia	3
Cameroon	1	Iran	2	Slovakia	2
Canada	3	Israel	1	South Africa	1
China	5	Italy	9	South Korea	1
Cote d'Ivoire	1	Japan	1	Sri Lanka	2
Croatia	3	Kenya	4	Switzerland	1
Czechia	2	Latvia	1	Timor-Leste	1
Egypt	2	Lithuania	1	Turkiye	2
Estonia	1	Malaysia	2	Uganda	1
Ethiopia	1	Malta	1	Ukraine	1
Finland	1	Melanesia	1	United Kingdom	1
France	1	Mexico	3	United States	10
Germany	4	Nepal	4	Venezuela	1

Table 5 Complete list of countries and regions and their categorization by high or low fertility and mortality levels

Countries, area, regions	Fertility	Mortality
Eastern Africa	high fertility	high mortality
Burundi	high fertility	high mortality
Comoros	high fertility	high mortality
Djibouti	high fertility	high mortality
Eritrea	high fertility	high mortality
Ethiopia	high fertility	high mortality
Kenya	high fertility	high mortality
Madagascar	high fertility	high mortality
Malawi	high fertility	high mortality
Mauritius	low fertility	low mortality
Mayotte	high fertility	low mortality
Mozambique	high fertility	high mortality

Réunion	low fertility	low mortality
Rwanda	high fertility	high mortality
Seychelles	low fertility	low mortality
Somalia	high fertility	high mortality
South Sudan	high fertility	high mortality
Uganda	high fertility	high mortality
Tanzania	high fertility	high mortality
Zambia	high fertility	high mortality
Zimbabwe	high fertility	high mortality
Central Africa	high fertility	high mortality
Angola	high fertility	high mortality
Cameroon	high fertility	high mortality
Central African Republic	high fertility	high mortality
Chad	high fertility	high mortality
Congo	high fertility	high mortality
Democratic Republic of the Congo	high fertility	high mortality
Equatorial Guinea	high fertility	high mortality
Gabon	high fertility	high mortality
Sao Tome and Principe	high fertility	low mortality
Northern Africa	high fertility	high mortality
Algeria	high fertility	low mortality
Egypt	high fertility	low mortality
Libya	high fertility	low mortality
Morocco	low fertility	low mortality
Sudan	high fertility	high mortality
Tunisia	low fertility	low mortality

Western Sahara	low fertility	high mortality
Southern Africa	high fertility	high mortality
Botswana	high fertility	high mortality
Eswatini	high fertility	high mortality
Lesotho	high fertility	high mortality
Namibia	high fertility	high mortality
South Africa	low fertility	high mortality
Western Africa	high fertility	high mortality
Benin	high fertility	high mortality
Burkina Faso	high fertility	high mortality
Cape Verde	low fertility	low mortality
Côte d'Ivoire	high fertility	high mortality
The Gambia	high fertility	high mortality
Ghana	high fertility	high mortality
Guinea	high fertility	high mortality
Guinea-Bissau	high fertility	high mortality
Liberia	high fertility	high mortality
Mali	high fertility	high mortality
Mauritania	high fertility	high mortality
Niger	high fertility	high mortality
Nigeria	high fertility	high mortality
Senegal	high fertility	high mortality
Sierra Leone	high fertility	high mortality
Togo	high fertility	high mortality
Central Asia	high fertility	low mortality
Kazakhstan	high fertility	low mortality

Kyrgyzstan	high fertility	low mortality
Tajikistan	high fertility	high mortality
Turkmenistan	high fertility	high mortality
Uzbekistan	high fertility	low mortality
Eastern Asia	low fertility	low mortality
China	low fertility	low mortality
Hong Kong	low fertility	low mortality
Macao	low fertility	low mortality
North Korea	low fertility	low mortality
Japan	low fertility	low mortality
Mongolia	high fertility	low mortality
South Korea	low fertility	low mortality
Southern Asia	high fertility	high mortality
Afghanistan	high fertility	high mortality
Bangladesh	high fertility	high mortality
Bhutan	low fertility	high mortality
India	high fertility	high mortality
Iran	low fertility	low mortality
Maldives	low fertility	low mortality
Nepal	high fertility	high mortality
Pakistan	high fertility	high mortality
Sri Lanka	low fertility	low mortality
South-Eastern Asia	low fertility	low mortality
Brunei	low fertility	low mortality
Cambodia	high fertility	high mortality
Indonesia	low fertility	low mortality

Laos	high fertility	high mortality
Malaysia	low fertility	low mortality
Myanmar/Burma	high fertility	high mortality
Philippines	high fertility	high mortality
Singapore	low fertility	low mortality
Thailand	low fertility	low mortality
Timor-Leste	high fertility	high mortality
Vietnam	low fertility	low mortality
Western Asia	high fertility	low mortality
Armenia	low fertility	low mortality
Azerbaijan	low fertility	low mortality
Bahrain	low fertility	low mortality
Cyprus	low fertility	low mortality
Georgia	low fertility	low mortality
Iraq	high fertility	high mortality
Israel	low fertility	low mortality
Jordan	high fertility	low mortality
Kuwait	low fertility	low mortality
Lebanon	low fertility	low mortality
Oman	high fertility	low mortality
Qatar	low fertility	low mortality
Saudi Arabia	low fertility	low mortality
Palestine	high fertility	low mortality
Syria	high fertility	low mortality
Türkiye	low fertility	low mortality
United Arab Emirates	low fertility	low mortality

Yemen	high fertility	high mortality
Eastern Europe	low fertility	low mortality
Belarus	low fertility	low mortality
Bulgaria	low fertility	low mortality
Czechia	low fertility	low mortality
Hungary	low fertility	low mortality
Poland	low fertility	low mortality
Moldova	low fertility	low mortality
Romania	low fertility	low mortality
Russia	low fertility	low mortality
Slovakia	low fertility	low mortality
Ukraine	low fertility	low mortality
Northern Europe	low fertility	low mortality
Denmark	low fertility	low mortality
Estonia	low fertility	low mortality
Finland	low fertility	low mortality
Iceland	low fertility	low mortality
Ireland	low fertility	low mortality
Latvia	low fertility	low mortality
Lithuania	low fertility	low mortality
Norway	low fertility	low mortality
Sweden	low fertility	low mortality
United Kingdom	low fertility	low mortality
Southern Europe	low fertility	low mortality
Albania	low fertility	low mortality
Bosnia and Herzegovina	low fertility	low mortality

Croatia	low fertility	low mortality
Greece	low fertility	low mortality
Italy	low fertility	low mortality
Malta	low fertility	low mortality
Montenegro	low fertility	low mortality
North Macedonia	low fertility	low mortality
Portugal	low fertility	low mortality
Serbia	low fertility	low mortality
Slovenia	low fertility	low mortality
Spain	low fertility	low mortality
Western Europe	low fertility	low mortality
Austria	low fertility	low mortality
Belgium	low fertility	low mortality
France	low fertility	low mortality
Germany	low fertility	low mortality
Liechtenstein	low fertility	low mortality
Luxembourg	low fertility	low mortality
Netherlands	low fertility	low mortality
Switzerland	low fertility	low mortality
Caribbean	low fertility	high mortality
Antigua and Barbuda	low fertility	low mortality
Aruba	low fertility	low mortality
Bahamas	low fertility	low mortality
Barbados	low fertility	low mortality
Cuba	low fertility	low mortality
Curaçao	low fertility	low mortality

Dominican Republic	low fertility	high mortality
Grenada	low fertility	low mortality
Guadeloupe	low fertility	low mortality
Haiti	high fertility	high mortality
Jamaica	low fertility	low mortality
Martinique	low fertility	low mortality
Puerto Rico	low fertility	low mortality
Saint Lucia	low fertility	low mortality
Saint Vincent and the Grenadines	low fertility	low mortality
Trinidad and Tobago	low fertility	low mortality
US Virgin Islands	low fertility	low mortality
Central America	low fertility	low mortality
Belize	low fertility	low mortality
Costa Rica	low fertility	low mortality
El Salvador	low fertility	low mortality
Guatemala	high fertility	low mortality
Honduras	high fertility	low mortality
Mexico	low fertility	low mortality
Nicaragua	high fertility	low mortality
Panama	low fertility	low mortality
South America	low fertility	low mortality
Argentina	low fertility	low mortality
Bolivia	high fertility	high mortality
Brazil	low fertility	low mortality
Chile	low fertility	low mortality
Colombia	low fertility	low mortality

Ecuador	low fertility	low mortality
French Guiana	high fertility	low mortality
Guyana	low fertility	high mortality
Paraguay	high fertility	low mortality
Peru	low fertility	low mortality
Suriname	low fertility	low mortality
Uruguay	low fertility	low mortality
Venezuela	low fertility	low mortality
Northern America	low fertility	low mortality
Canada	low fertility	low mortality
United States	low fertility	low mortality
Australia/New Zealand	low fertility	low mortality
Australia	low fertility	low mortality
New Zealand	low fertility	low mortality
Melanesia	high fertility	high mortality
Fiji	high fertility	high mortality
New Caledonia	low fertility	low mortality
Papua New Guinea	high fertility	high mortality
Solomon Islands	high fertility	low mortality
Vanuatu	high fertility	high mortality
Micronesia	high fertility	high mortality
Guam	high fertility	low mortality
Kiribati	high fertility	high mortality
Polynesia	high fertility	low mortality
French Polynesia	low fertility	low mortality
Samoa	high fertility	low mortality

Tonga	high fertility	low mortality

Table 6 Complete list of members of the steering group

Member	**Main affiliation (at the time of the survey design)**
Blessing Mberu	African Population and Health Research Centre
Guy Abel	Asian Demographic Research Institute, Shanghai University
Leiwen Jiang	Asian Demographic Research Institute, Shanghai University*
Francesco.billari	Bocconi University
Endale Birhanu Kebede	Department of Demography, University of Vienna*
Dario Tarchi	European Commission Joint Research Centre
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Fabrizio Natale	European Commission Joint Research Centre
Philipp Ueffing	European Commission Joint Research Centre
Rossella Icardi	European Commission Joint Research Centre
Tommi Asikainen	European Commission Joint Research Centre
Anne Goujon	International Institute for Applied Systems Analysis*
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Samir KC	International Institute for Applied Systems Analysis*
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Marlene Lee	Population Reference Bureau
Toshiko Kaneda	Population Reference Bureau
Sabine Henning	United Nations Economic and Social Commission for Asia and the Pacific
Fabiana Del Popolo	United Nations Economic Commission for Latin America and the Caribbean
Guangyu Zhang	United Nations Department of Economic and Social Affairs-Population Division

John Wilmoth	United Nations Department of Economic and Social Affairs-Population Division
Karoline Schmid	United Nations Department of Economic and Social Affairs-Population Division
Lina Bassarsky	United Nations Department of Economic and Social Affairs-Population Division
Patrick Gerland	United Nations Department of Economic and Social Affairs-Population Division
Vladimira Kantorova	United Nations Department of Economic and Social Affairs-Population Division
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