

# Annex 1: Detailed recommendations on content

## Section 1: Introduction and Overview

This section would be of use both for beginning students in a Master's demography program and also, potentially, by students enrolled in other nearby disciplines.

Topic 1.1 Thinking about demography. Overview of flows (mortality, fertility, migration) and structures (age pyramid). The balancing equation. Population growth, booms and echoes, growth momentum. Demographic transition. Case study: demographic dividend. Brief introduction to concepts of population projections.

Topic 1.2 Demographic rates, probabilities, etc. (emphasizing basic mortality measures). Person years. Prevalence vs. incidence. Cohorts, period and synthetic cohorts. Standardization. Lexis diagrams and perhaps surfaces.

Topic 1.3 Introduction to life tables – how they work ( $m$ ,  $q$ ,  $d$ ,  $l$ ,  $L$ ,  $T$ , and  $e$ ; but the derivation of the original seed values is covered later) and their broad value. Concept of population homogeneity and heterogeneity, and the effects of selectivity (selective attrition).

Topic 1.4 Fertility – basic measures (CBR, TFR, parity progression). Notions of quantum vs tempo. Natural fertility. Proximate determinants: overview of the concepts and ideas (what are intermediate variables, and issues of their endogeneity).

Topic 1.5 Migration and population distribution across space: basic measures.

Topic 1.6 The component method of population projection. projection of fertility, mortality and migration.

## Section 2: Data sources, collection and evaluation

Topic 2.1 Overview of data bases. Data sources (civil registration, censuses, surveys, surveillance), their value and their limitations. The rationale for certain questions (e.g., socio-economic status, orphans).

Topic 2.2 Surveys. The process of designing and fielding a survey, then of entering and editing the data and finally issues of archiving data. (Note that we would also recommend that institutions have their students design and field a survey as part of the course work.) This would cover the whole survey process from planning through to analysis, dissemination and archiving; recognizing and making use as needed of work by the UNSD in this area.

Topic 2.3 Evaluation – diagnostics of data, questions of biases and their origins (e.g. bad memory versus deliberate dissimulation (social desirability)). Possible case study: adolescent sexual behaviours.

## Section 3: Core methods of population analysis

Topic 3.1 Introduction to continuous survival—Kaplan-Meier survival curves. Advanced life tables and Increment/decrement life tables – the construction of single decrement life tables from first principles, decomposition of life expectancy, etc. Followed by multiple- and increment-decrement life tables. Two versions of this module should be developed, one needing only high school algebra and the other requiring calculus.

Topic 3.2 Mathematical representations of mortality (a preface presentation would quickly show how to use logits). This would include mathematical formulations of mortality functions (Gompertz, Makeham, Helligman-Pollard), as well as model life tables (Coale-Demeny; Indepth; Wilmoth, others....). Choice of an appropriate standard.

Topic 3.3 Mathematical representations of fertility, nuptiality and migration (the Coale-Trussel, Coale-McNeil and Rodgers-Castro models)

Topic 3.4 Population dynamics under differing circumstances (stable population etc), variable  $r$ , relations between vital rates and population momentum. This would be presented conceptually, graphically or using simulations (excel...) that all students with algebra could take, with a solid appendix containing more advanced mathematics and proofs for students mastering calculus.

NB Detailed consideration of population projections will be addressed elsewhere

#### **Section 4 Practical applications and extensions to health, reproduction, human capital and well being, and population ageing**

Topic 4.1 Demography and health. Mostly extensions: anthropometrics, DALYs, burden of disease calculations, etc. The effects of an evolving population age structure on the incidence/prevalence of different types of health problems and demands for services (projecting service demands; links between demographic and epidemiological transitions).

Topic 4.2 Demography and reproductive health: Unmet need and contraceptive use, adolescent fertility, abortion rates, maternal mortality, etc.

Topic 4.3 Demography and human capital: extending demographic methods to schooling (enrolment, dropouts...) and labour force (prerequisite knowledge of projections required for this topic).

Topic 4.4 Population ageing, including family support, pension systems, health care costs etc.