Evaluation of migration and socioeconomic data collected from censuses

United Nations Statistics Division

United Nations Workshop on Census Data Evaluation
Hanoi, Viet Nam
2 – 6 December 2013

Overview

1. Internal and international migration
   1. Core topics
   2. Demographic methods
   3. Comparison with other sources
2. Socioeconomic data – comparison with other sources
   a) Household size
   b) Marital status
   c) Literacy and school attendance
   d) Economic activity

Internal migration

- ❑ Core topics suggested in UN Principles and Recommendations for 2010 round of censuses:
  - ■ Place of birth – measuring life time migration

  - ■ Two approaches for measuring current movements
    - ❑ Duration of residence in current usual residence and place of previous residence
    - ❑ Place of residence at a specified date in the past- one year or five years preceding the census

Internal migration- Basic concepts

❑ **In-migrants:** person who enters a migration-defining area by crossing its boundary from some point outside the area, but within the same country

❑ **Out-migrants:** person who departs from a migration-defining area by crossing its boundary to a point outside it, but within the same country.

❑ **Net migration:** difference between in and out migrants

Internal migration from census

Table 1. Population 5 Years of Age and Over, by Sex and Place of Usual Residence Five Years Ago
- Japan (1990, 2000)

Sex	Population 5 years of age and over 1)	Present address	Other place than present address (migrants)						
			Total	Same prefecture				Other prefectures	Outside Japan
				Total	Same shi, ku, machi or mura	Other ku of the same shi	Other shi, ku, machi or mura		
Population (000s)									
[2000]									
Total	120,793	86,819	33,973	24,961	15,137	1,966	7,858	8,389	623
Male	58,940	41,633	17,307	12,321	7,554	952	3,816	4,679	307
Female	61,853	45,186	16,666	12,640	7,583	1,015	4,042	3,710	316
[1990]									
Total	116,792	87,266	29,507	20,226	11,073	1,846	7,307	8,889	392
Male	57,148	42,031	15,106	9,844	5,367	910	3,567	5,054	207
Female	59,644	45,235	14,401	10,381	5,706	935	3,740	3,835	185
Ratio (%)									
[2000]									
Total	100.0	71.9	28.1	20.7	12.5	1.6	6.5	6.9	0.5
Male	100.0	70.6	29.4	20.9	12.8	1.6	6.5	7.9	0.5
Female	100.0	73.1	26.9	20.4	12.3	1.6	6.5	6.0	0.5
[1990]									
Total	100.0	74.7	25.3	17.3	9.5	1.6	6.3	7.6	0.3
Male	100.0	73.5	26.4	17.2	9.4	1.6	6.2	8.8	0.4
Female	100.0	75.8	24.1	17.4	9.6	1.6	6.3	6.4	0.3

1) Includes "Place of usual residence five years ago not reported".

Net interstate migration, Australia

3.2 NET INTERSTATE MIGRATION—1991–2001

	1991–1996......	1996–2001......
New South Wales	−71 770	−66 549
Victoria	−107 832	6 444
Queensland	201 038	92 188
South Australia	−23 108	−12 894
Western Australia	11 526	2 886
Tasmania	−9 136	−15 043
Northern Territory	−1 831	−2 170
Australian Capital Territory	1 113	−4 642
Total(a)	. .	. .

(a) Includes Other Territories for 1996–2001.

3.17 INTERSTATE MOVES MADE BY INDIGENOUS PERSONS—1996–2001 CENSUS

STATE/TERRITORY OF ARRIVAL.............................

State/territory of departure	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total(a)
New South Wales	. .	885	3 037	297	304	114	200	483	5 349
Victoria	541	. .	521	202	126	103	81	30	1 604
Queensland	1 909	493	. .	214	388	146	647	178	3 975
South Australia	209	239	227	. .	274	35	265	27	1 276
Western Australia	225	169	342	271	. .	85	506	34	1 632
Tasmania	143	220	266	62	117	. .	44	18	870
Northern Territory	200	140	859	447	429	7	. .	54	2 136
Australian Capital Territory	404	38	183	25	37	8	49	. .	747
Total(a)	3 648	2 188	5 435	1 518	1 675	498	1 792	824	17 610
Net gain/loss	**–1 701**	**584**	**1 460**	**242**	**43**	**–372**	**–344**	**77**	**. .**

8.26 x 11.69 in

Internal migration-Demographic methods

❑ **Indirect measures of net internal migration**

- ■ Vital statistics method
- ■ Survival ratio method
  - ❑ Life table survival ratios

Internal migration-Demographic methods

Vital statistics methods

$$M = P_t - P_0 - (B - D)$$

M: Net migration for a given area (estimation)

P_t: Population of a given area at year t - the later census

P_0: Population of a given area at year 0 - the earlier census

B: <u>the number of births</u> that occurred to residents of the area during the inter-censal period

D: <u>the number of deaths</u> that occurred to residents of the area during the inter-censal period

Internal migration-Demographic methods

Vital statistics method – example

	Population		Rate of net migration
	2001	**1991**	
Austria: Burgenland	277569	270880	0.0159
Austria: Corinthia	559404	547798	0.0124
Austria: Lower Austria	1545804	1473813	0.0401
Austria: Salzburg	515327	482365	0.0596
Austria: Styria	1183303	1184720	-0.0100
Austria: Tirol	673504	631410	0.0579
Austria: Upper Austria	1376797	1333480	0.0237
Austria: Vienne	1550123	1539848	-0.0021
Austria: Vorarlberg	351095	331472	0.0504
Austria: Total	**8032926**	**7795786**	

Data source: graph produced based on data from United Nations Demographic Yearbook

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Internal migration-Demographic methods

Survival-rate method

$$M_x^{x+t} = (P_{x+t}^t - SP_x^0)$$

M_x^{x+t} Net migration for the survivals among persons aged x at the first census in a given area (they will be aged x+t at the second census)

P_{x+t}^t Population size for cohort x at year t (second census)

S Survival rate of the cohort x from year 0 to year t

P_x^0 Population size for cohort x at year 0 (first census)

Internal migration-Demographic methods Survival rate method – Exp. Vienna, Austria

Age	Population in 1991	10-year life table survival ratio	Age	Population in 2001	expected survivors	Net migration
1	2	3	4	5	(6) = (2)*(3)	(7) = (5) - (6)
0 - 4	39,766	0.99623	0 - 4	NEW COHORTS		
`5-9	36,574	0.99147	`5-9			
`10-14	34,289	0.98836	`10-14	38,867	39,616	-749
15 - 19	40,166	0.98778	15 - 19	38,979	36,262	2,717
20 - 24	62,313	0.98576	20 - 24	42,705	33,890	8,815
25 - 29	72,289	0.98007	25 - 29	54,108	39,675	14,433
30 - 34	62,655	0.96903	30 - 34	69,222	61,426	7,796
35 - 39	51,290	0.95187	35 - 39	71,228	70,848	380
40 - 44	56,236	0.92706	40 - 44	59,845	60,715	-870
45 - 49	56,240	0.88693	45 - 49	49,023	48,821	202

Internal migration-Demographic methods Survival rate method – Exp. Vienna, Austria

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35 - 39	51,290	0.95187	45 - 49	49,023	48,821	202
40 - 44	56,236	0.92706	50 - 54	51,774	52,134	-360
45 - 49	56,240	0.88693	55 - 59	49,495	49,881	-386
50 - 54	48,941	0.82641	60 - 64	41,373	40,445	928
55 - 59	32,213	0.74914	65 - 69	25,381	24,132	1,249
60 - 64	33,819	0.63985	70 - 74	24,730	21,639	3,091
65 - 69	30,831	0.48801	75 - 79	19,593	15,046	4,547
70 - 74	19,021	0.39927	80 - 84	9,472	7,595	1,877
75 - 79	18,050	0.33555	85 - 89	5,486	6,057	-571
80 +	19,832	0.20472	90+	2,336	4,060	-1,724
All ages	714,525		Total 10+	653,617	612241	41376

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International migration

❑ Core topics recommended in the P&R

   ■ Citizenship – stock of foreigners

   ■ Country of birth –stock of foreign-born population

   ■ Year or period of arrival-current movement

      ❑ Year and month of arrival permit the calculation of the number of completed years between the time of arrival and the census date

      ❑ Provides estimation on the number of immigrants by year of arrival

Possible methods

- ❑ Census provides data on immigrants – no accurate data available on emigrants from census

- ❑ Indirect method to estimate immigration of foreigners using place of birth data

- ❑ Comparison with administrative sources-border registers, residence permits, population registers, migration surveys

Estimating immigration of foreigners using place of birth data

❑   Data requires to estimate immigration of foreigners:

  ● The number of foreign-born females /males, in five year age groups for two censuses

  ● For estimating the deaths for foreigners, a suitable life table –model life table

Estimated immigrants $$M_x^{x+t} = F_{x+t}^{t} - SF_x^{0}$$

International migration- Comparison with other sources

❑ **Border registers** -arrivals and departures

- ❑ Border flow data can provide a total picture of the documented movements into, or out of, a country over a specified period of time –one year, five years, etc.- providing data on age-sex, type of visa, nationality

- ❑ Matching census data and border registers for arrivals can be used to evaluate census results –and vice versa

- ❑ For example, Australia matched the 2006 census results for all overseas-born persons who had arrived in Australian between 2001 and 2006 with the Department of Immigration and Citizenship records

Source: Measuring international migration through population censuses, UN Expert Group Meeting, 2007

International migration- Comparison with other sources

❑ Other possible sources

- ❑ **Resident permits** -Ideally, the number of valid residence permits at a given time can be equated with the number of foreigners residing legally in a country

- ❑ **Population registers-** total resident population including registers of foreigners

- ❑ **Migration surveys-** Migrants often concentrate in particular areas compared with the entire population so that block sampling or other area based sampling techniques can significantly over or under represent them

Source: Measuring international migration through population censuses, UN Expert Group Meeting, 2007

International migration- Comparison with other sources

❑ # Challenges

- ◼ Harmonization of the definitions and concepts used in each sources of data

- ◼ Collaboration with different government agencies - *responsible for administrative registration such as immigration officials for border statistics, labor departments for immigrant workers statistics, department of interior for population registers, etc.*

- ◼ Statistics law for compiling data from other government agencies

Differences between number of arrivals and departures, Turkey, 2000-2012
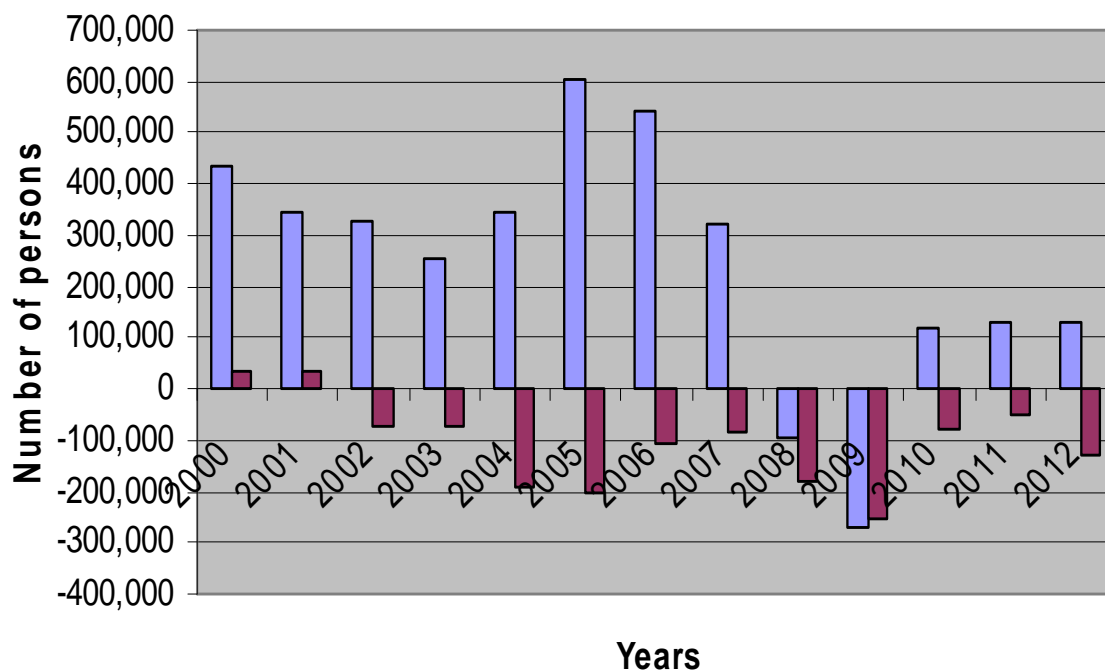
Net immigration for foreigners

Requires further analysis-matching arrivals/departures - to estimate immigration

Net emigration for citizens

EVALUATION OF SOCIOECONOMIC DATA

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Socioeconomic data from censuses

For consistency check of census data with other sources;

❑ Standard definitions for socioeconomic data should be used in all sources- otherwise results of evaluation will be significantly affected by differences in definitions

❑ Different approaches in formulating questions can affect the results of specific source

■ Detailed questions used in LFS for measuring employment status while few questions are used for census purpose

What can be done to check data quality?

- Check the internal consistency of the data
  - Whether plausible when tabulated or cross-tabulated with other characteristics
- Compare with other sources
  - Make sure that definitions used are consistent
  - Graph the derived indicators
  - Cohort analysis of certain indicators
  - Disaggregate by sex and age
- Re-interview surveys, where people were re-interviewed and content of the census responses is verified

Main types of socioeconomic characteristics from censuses

- Household and family characteristics
  - Relationship to household head or other reference member
- Demographic and social characteristics
  - Age
  - Sex
  - Marital status
- Educational characteristics
  - Literacy
  - School attendance
  - Educational attainment
- Economic characteristics
  - Economic activity status (labor force participation)
  - Occupation
  - Industry
  - Status in employment

Core topics from the *Principles and Recommendations for Population and Housing Censuses*, Rev. 2

Household composition

- ❑ Most censuses use the household as the unit of enumeration
  - ▪ A "household" is typically defined by the common provision of food or other essentials
    - ❑ A household may consist of one person who provides for these essentials on his own
    - ❑ Not all household members (or even no household members) need be related
  - ▪ A "family" consists of individuals who are related by blood, adoption or marriage
    - ❑ Must contain at least 2 individuals
  - ▪ In many countries, there may be multiple family units residing in one household

Education

- ❑ Three core concepts
  - ■ **Literacy** – ability to read and write a short, simple statement
  - ■ **School attendance** – current, regular attendance at an accredited educational institution or program
    - ❑ Distinguished from enrollment, which means that the student is officially registered at school, not necessarily that s/he actually goes to class
  - ■ **Educational attainment** – highest grade completed within the most advanced level reached in the educational system(1997 ISCED classification)

Economic activity

❑ Activity status – a person's relationship to economic activity during a short reference period (typically a week)

- **Employed** – a person who worked a defined, minimum amount of time over the reference period (may be as little as an hour)

- **Unemployed** – a person who did not work the minimum amount of time during the reference period but was <u>willing and able to work and looking for a job</u>

- **Inactive** (out of labor force)– a person who did not work the minimum amount of time during the reference period and did not want to work/was not looking for work

❑ Both the employed and the unemployed are economically active

- Employed + unemployed = labor force

Economic activity

- ❏ **Difficulties:**
  - ■ What does "work" mean?
    - ❏ Goods and services produced for the market
    - ❏ Goods produced for own-use (replacing need to buy on market)
    - ➢ In practice, this is quite difficult to measure, especially in areas with large agricultural or informal economies
    - ➢ Women's home-based production in particular is often undercounted in censuses
  - ■ What does "looking for a job" mean?
    - ❏ E.g. some persons may have registered at a government labor office months ago, but done nothing else. Are they looking for a job?

Additional economic characteristics

❑ **Occupation** – type of work that the person performs (most recent ISCO classification)

❑ **Industry** – kind of production that the establishment in which the person works engages in (most recent ISIC classification)

❑ **Status in employment** – type of contract the person has with his place of work (ICSE from the ILO)

  ◼ Recommended categories: Employee; Employer; Own-account worker; Contributing family worker; Members of producer cooperatives; Persons not classifiable by status

Source: *Principles and Recommendations for Population and Housing Censuses, Rev.2,* United Nations, 2008

Evaluation of data

Household size – comparison with other sources
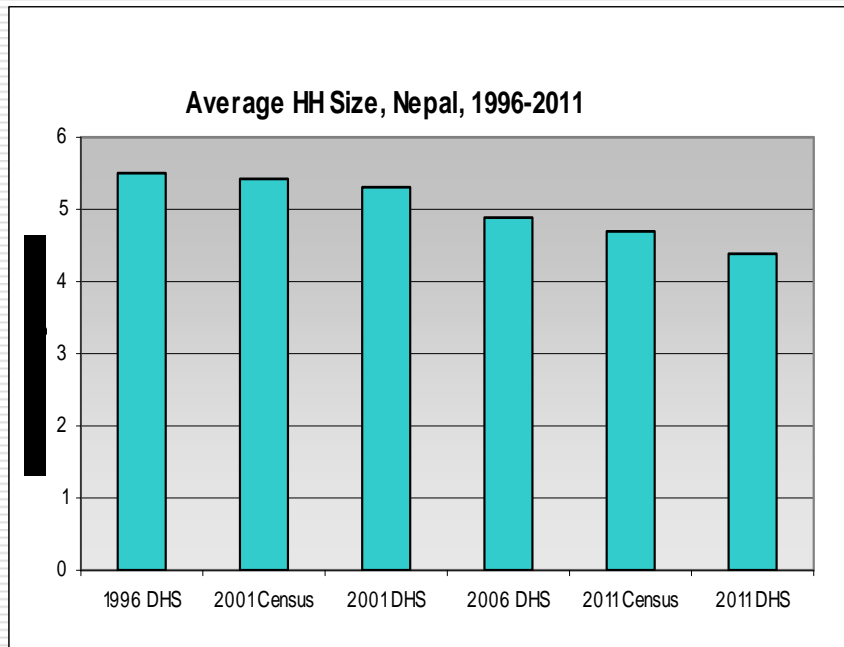
Average HH Size, Nepal, 1996-2011

Data source: graph produced based on data from the United Nations *Demographic Yearbook* and DHS STATcompiler

Proportion of female headed households (%), Nepal, 1996-2011

Household size – comparison with other sources

Distribution of households by size, Nepal, 1991-2006
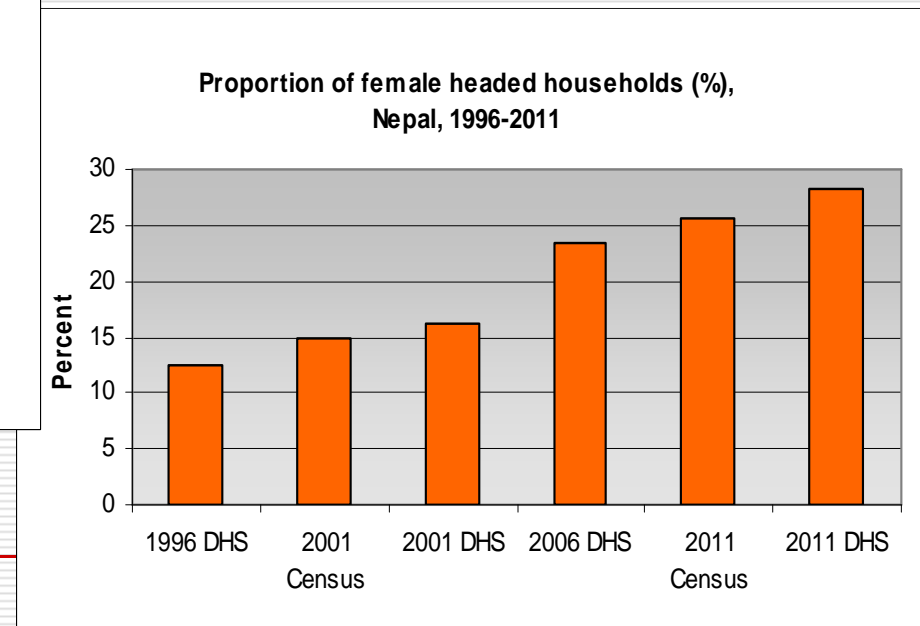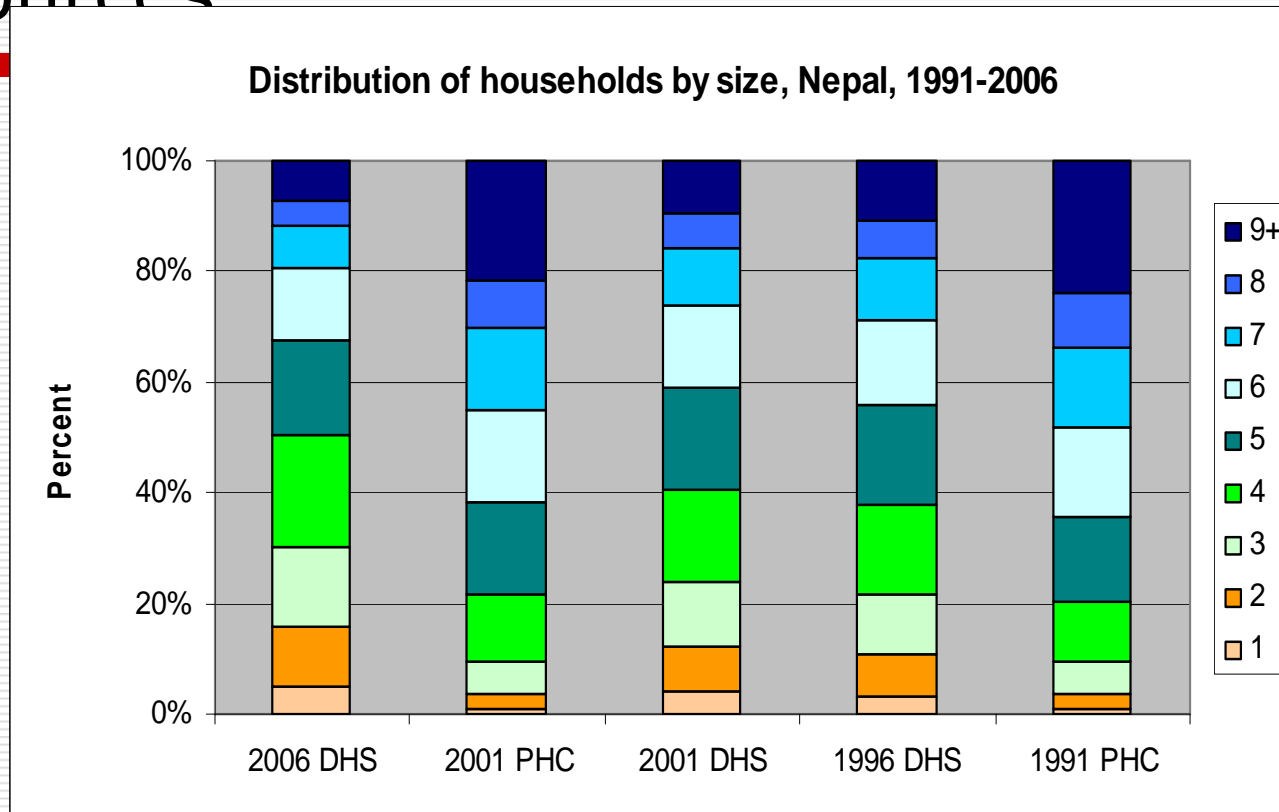
Data source: graph produced based on data from the United Nations *Demographic Yearbook* and DHS STATcompiler

Percent never married – comparison with DHS
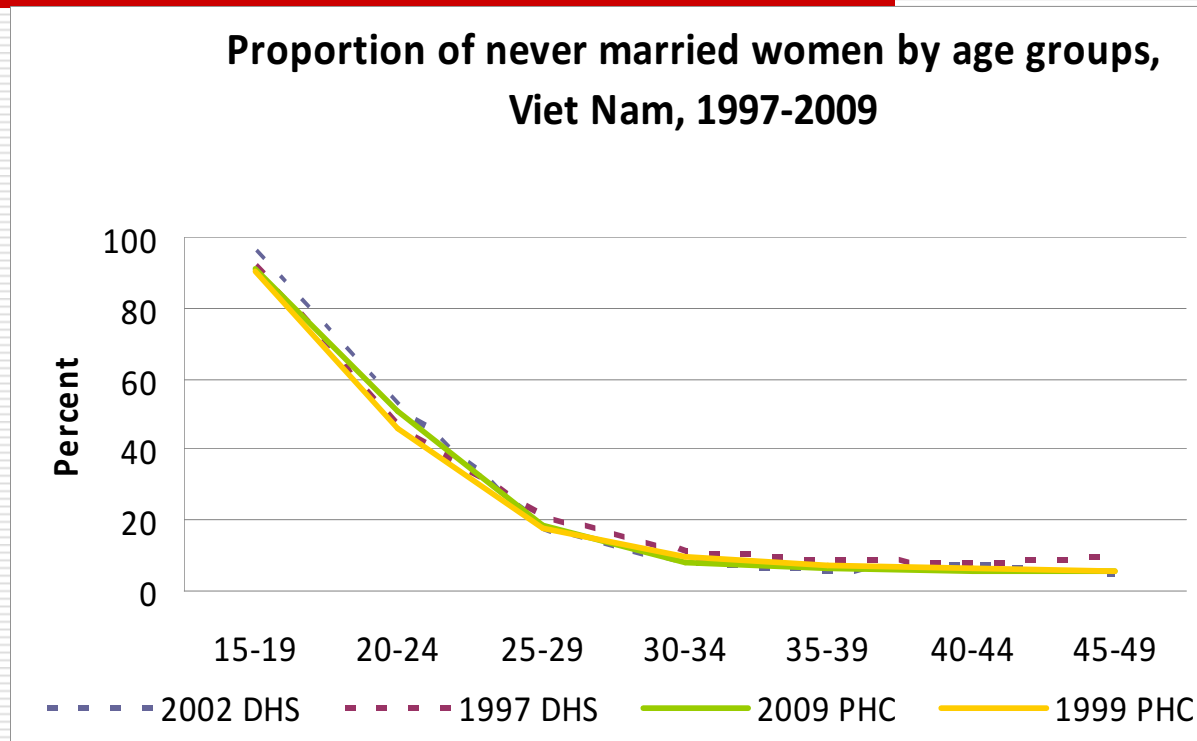
**Proportion of never married women by age groups,
Viet Nam, 1997-2009**

Source:United
Nations
*Demographic
Yearbook* and
DHS Uganda
country
reports

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Percent married – comparison with DHS

Propotion of married women by age groups, Viet Nam, 1997-2009
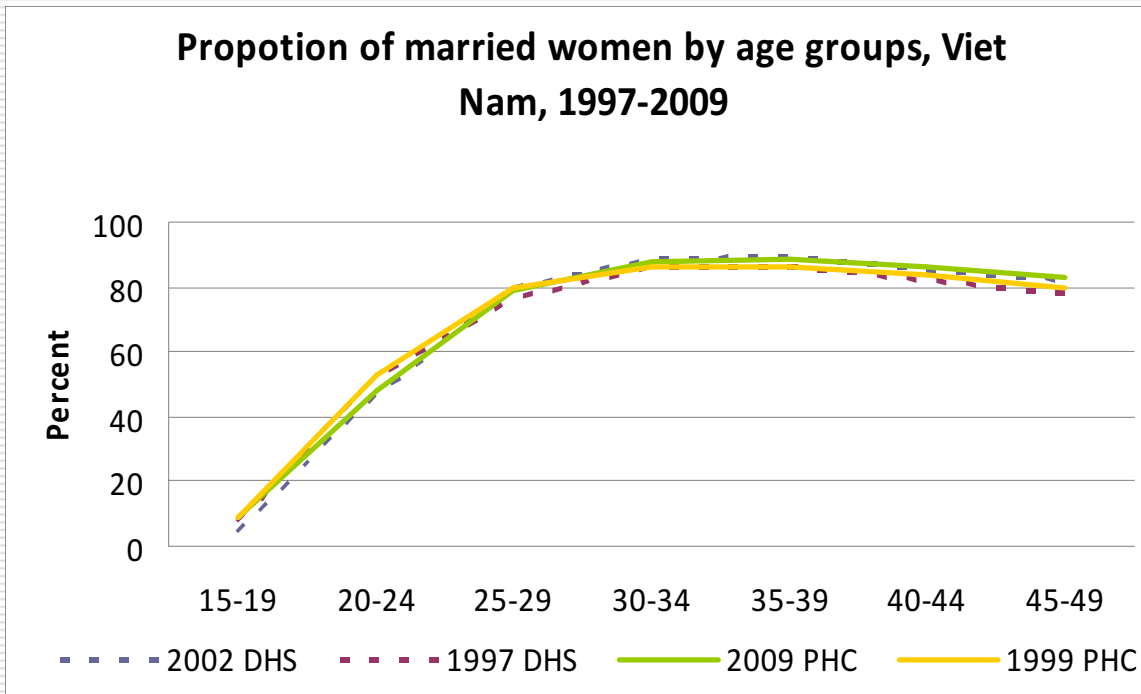
Source:United Nations *Demographic Yearbook* and DHS Uganda country reports

Singulate Mean Age at First Marriage (SMAFM)

- ❑ Technique for estimating the mean age at first marriage when actual dates of marriage are not available
  - ■ Is a period measure (uses a synthetic cohort)
- ❑ Very simple data requirements:
  - ■ Total number of women by 5-year age groups
  - ■ Total number of ever-married women by 5-year age groups
- ❑ The method estimates the average number of years lived in the single state by those who marry before age 50

SMAFM calculation (1)

Source: Wachter, Ken, *Essential Demographic Methods*, Data from United Nations *Demographic Yearbook*

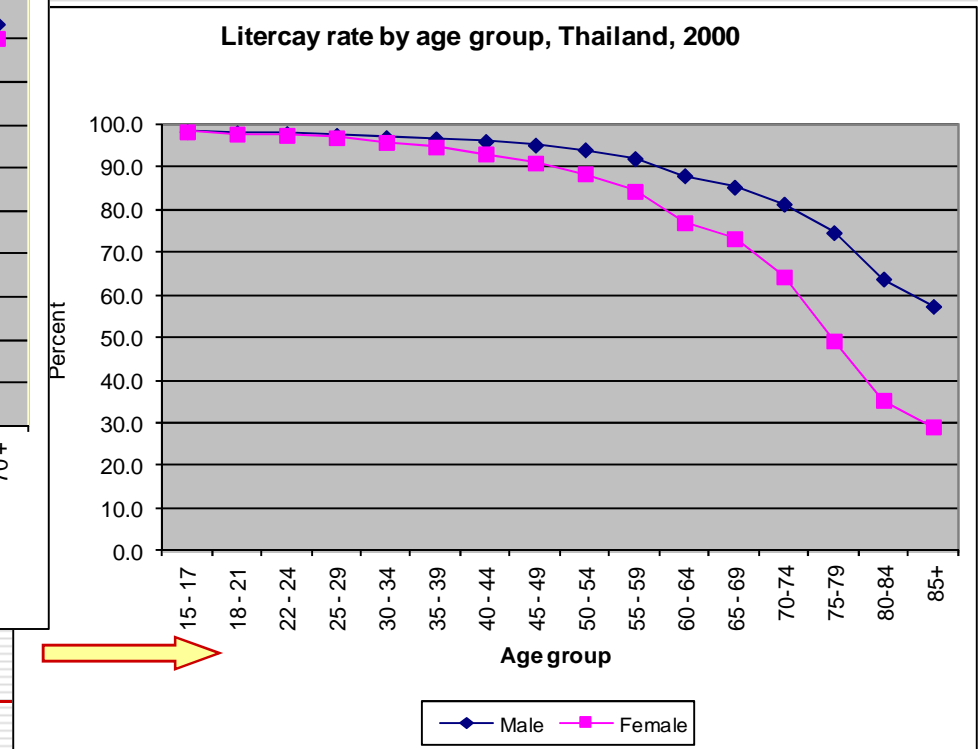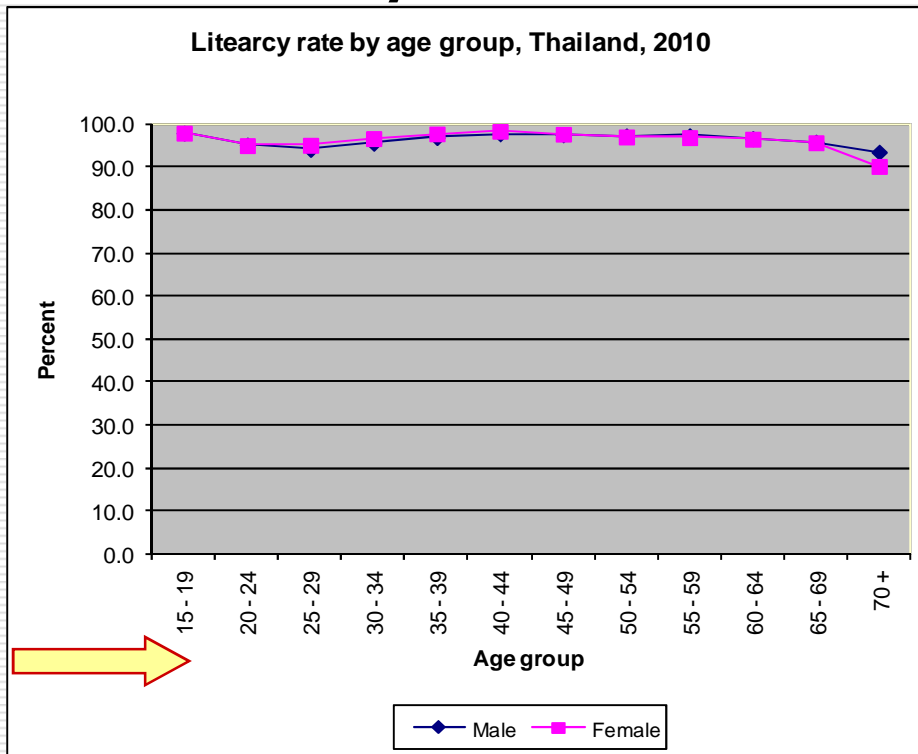**Singulate Mean Age at First Marriage, Viet Nam, 2009**

Age group	Total Women	Ever-married women	PEM = (2)/(1)	Sx = 1 - PEMx / PEMult	n * Sx
	(1)	(2)	(3)	(4)	(5)
15-19	4385988	384378	0.087638		
20-24	4179249	2056514	0.492077		
25 - 29	3885273	3176539	0.817585		
30 - 34	3405253	3132418	0.919878		
35 - 39	3233341	3035302	0.938751		
40 - 44	2998922	2827496	0.942837		
45 - 49	2808462	2651466	0.944099		

PEMult ←

PEM is the propotion of ever-married women
PEMult is the estimation of propotion of women ultimately married
Sx: the estimation of the propotion of women who do ultimately marry
   who are still single in the age group from x to x+n.

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SMAFM calculation (2)

Singulate Mean Age at First Marriage, Viet Nam, 2009

Age group	Total Women	Ever-married women	PEM = (2)/(1)	Sx = 1 - PEMx / PEMult	n * Sx
	(1)	(2)	(3)	(4)	(5)
15-19	4385988	384378	0.087638	0.90717	4.53587
20-24	4179249	2056514	0.492077	0.47879	2.39393
25 - 29	3885273	3176539	0.817585	0.13401	0.67003
30 - 34	3405253	3132418	0.919878	0.02565	0.12827
35 - 39	3233341	3035302	0.938751	0.00566	0.02832
40 - 44	2998922	2827496	0.942837	0.00134	0.00668
45 - 49	2808462	2651466	0.944099	0	
					7.7631

$$SMAFM = 15 + \sum n * Sx$$ 22.8

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Literacy rate

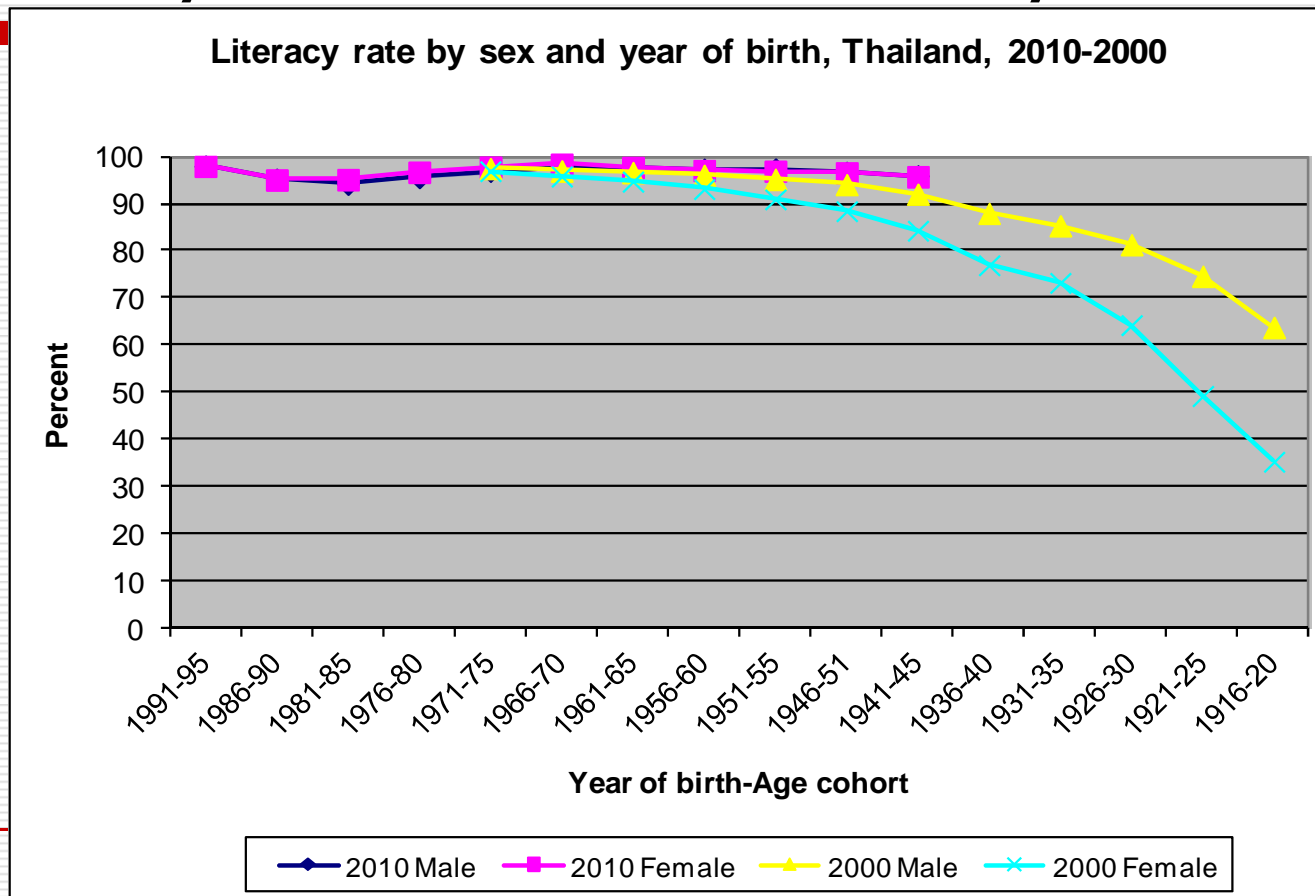Litearcy rate by age group, Thailand, 2010

Litercay rate by age group, Thailand, 2000

Data source: Graph produced based on data from the
United Nations *Demographic Yearbook*

Literacy rate – cohort analysis

Literacy rate by sex and year of birth, Thailand, 2010-2000

Data source: Graph produced based on data from the United Nations *Demographic Yearbook*
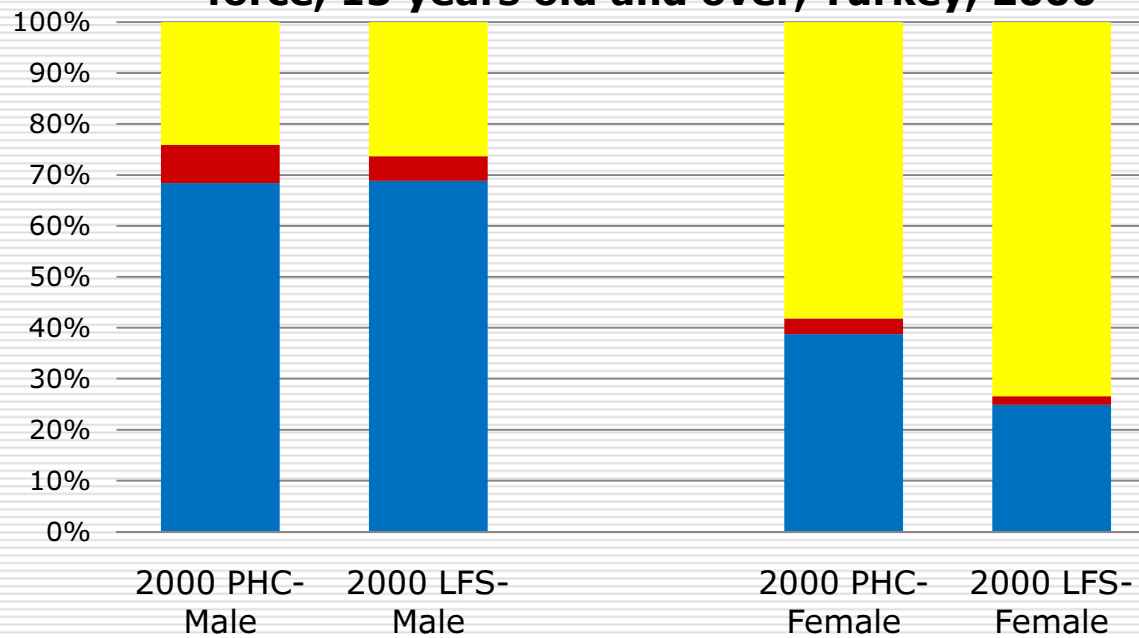
School attendance

Propotion of children attending scool, Thailand, 2000 and 1980 Censuses
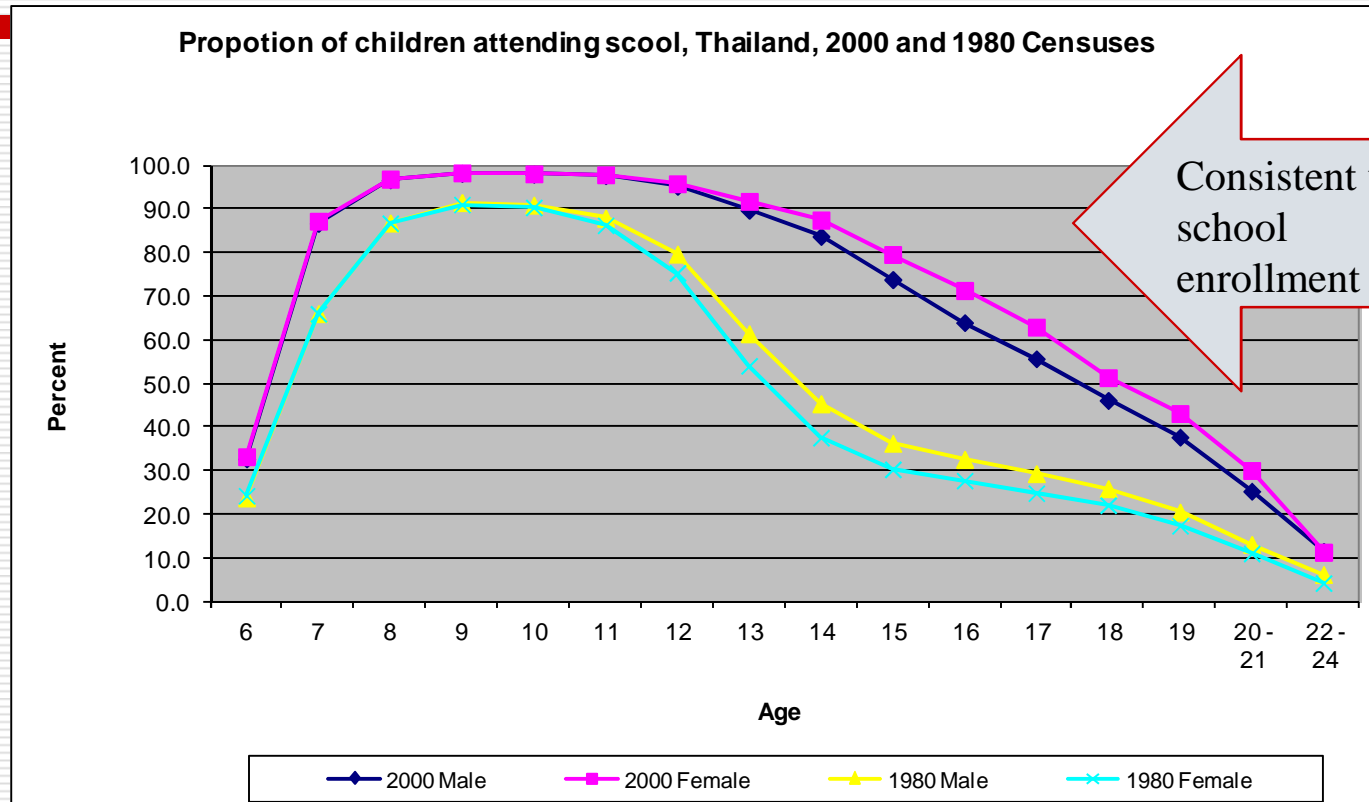
Consistent with school enrollment ?

Data source: Graph produced based on data from the United Nations *Demographic Yearbook*

Labor force participation

Share of employed and unemployed population and population not in labor force, 15 years old and over, Turkey, 2000
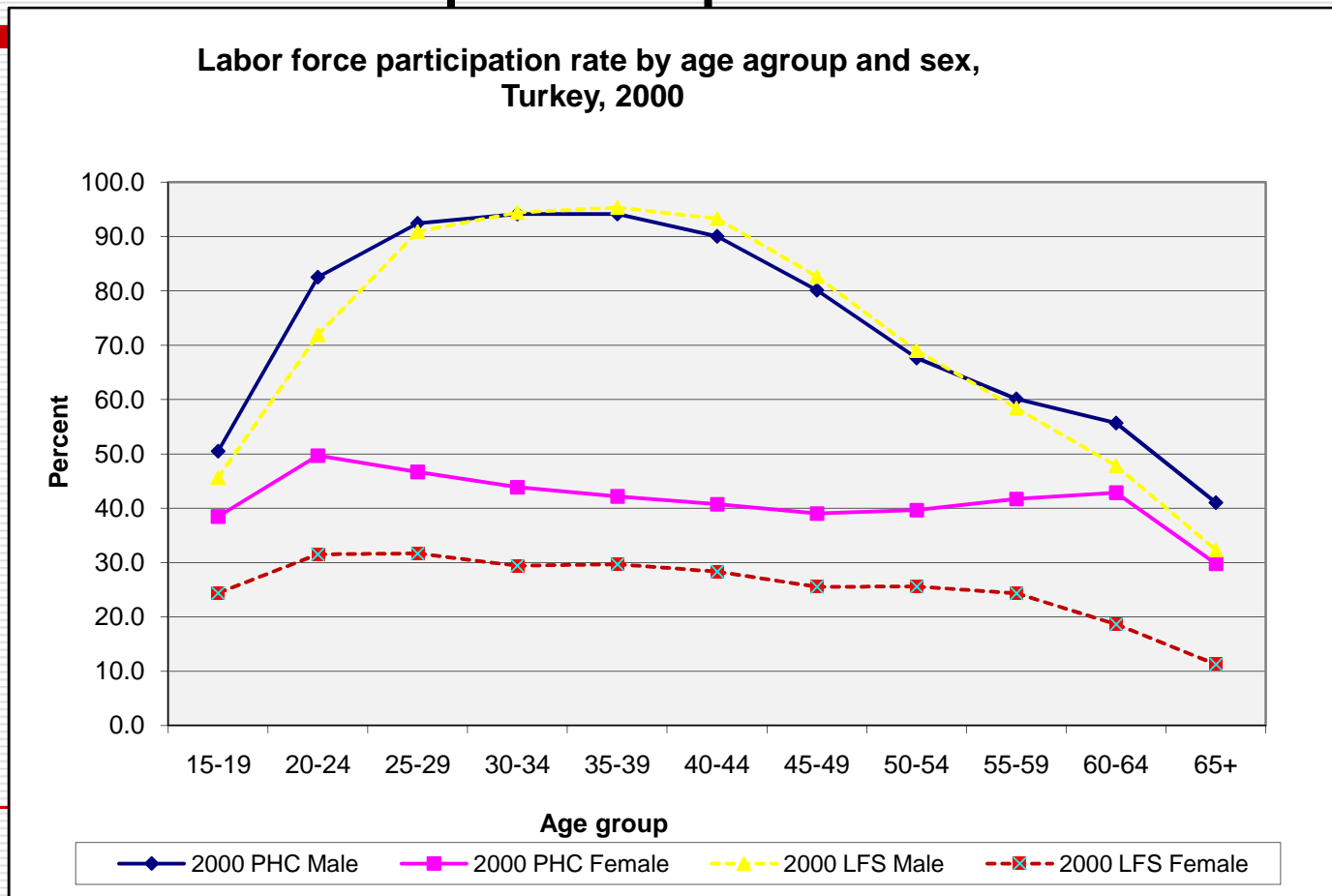

PHC- conducted in October indicating seasonal effect

LFS - Annual average of four periodic surveys eliminating seasonal effect

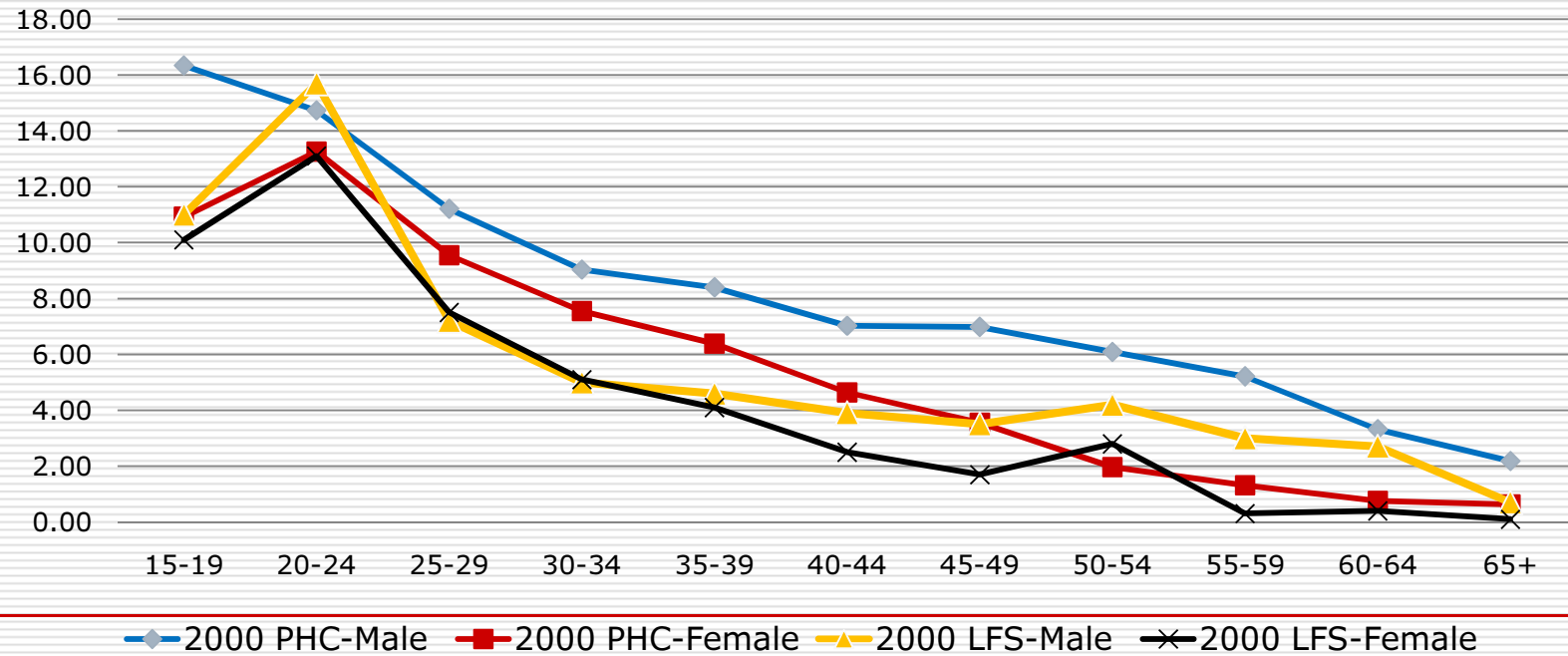■ **Employed** ■ **Unemployed** ■ **Not in labor force**

Labor force participation

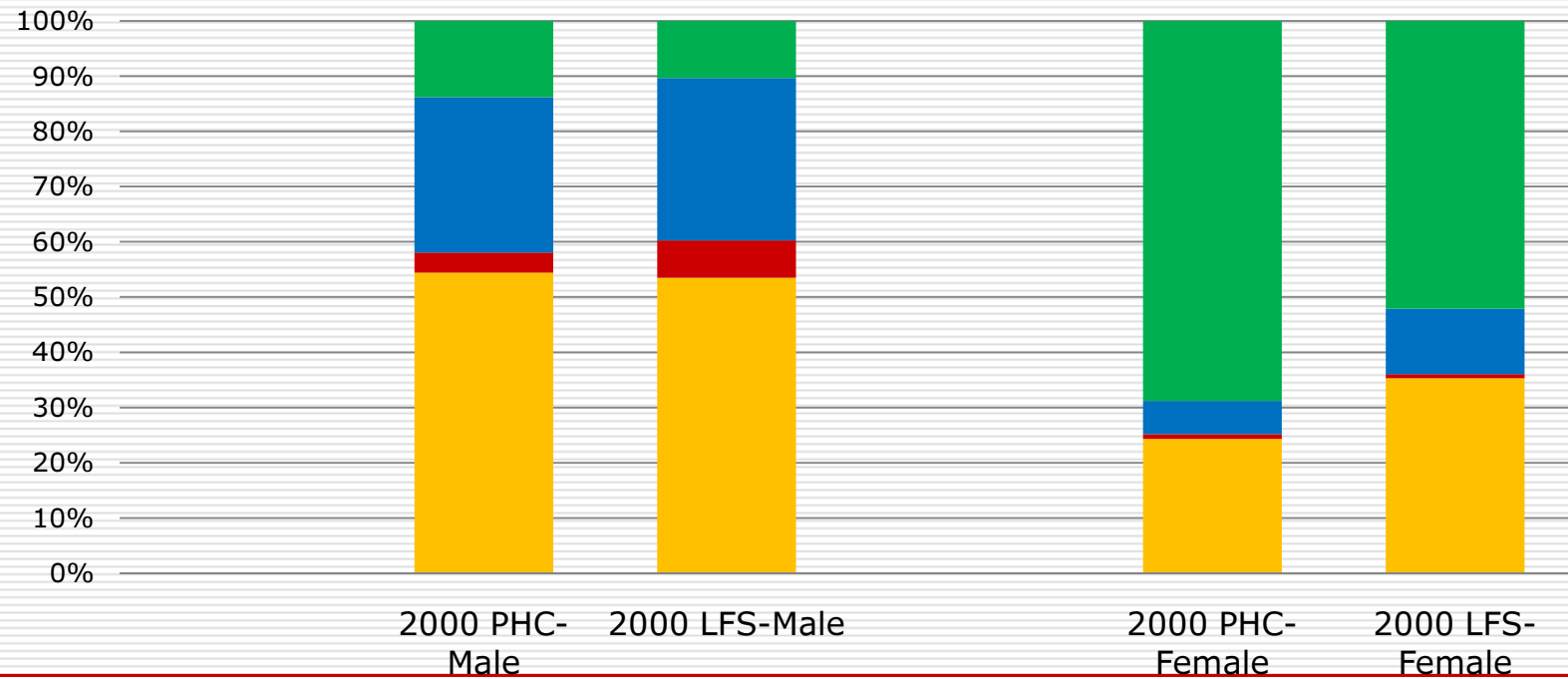Labor force participation rate by age agroup and sex, Turkey, 2000

Unemployment

Unemployment rate by age group, Turkey, 2000

Legend: 2000 PHC-Male, 2000 PHC-Female, 2000 LFS-Male, 2000 LFS-Female

Employment Status