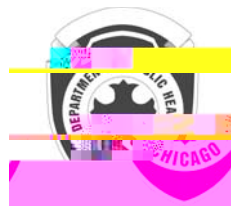Special Report

THE IMPACT OF POPULATION STRUCTURE ON HEALTH DISPARITIES

JANUARY 2006

City of Chicago
Department of Public Health
Office of Epidemiology

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1 Why does a race have different racial/ethnic disparities between different racial/ethnic groups?

Population pyramids are graphical representations of a country's fertility and death rates and can provide valuable information on the health of a population. There are three major shapes of population pyramids:

- Triangular
- Rectangular
- Inverted

The triangular pyramid has a wide base, indicating high birth and death rates (Figure 1a). The rectangular pyramid has an approximately equal base and tip, indicating equal birth and death rates (Figure 1b). The inverted pyramid has a narrower base than tip, indicating a falling birth rate compared to the death rate (Figure 1c). Each shape of population pyramid is a reflection of the health of the population it represents especially your chances of surviving at different age intervals (1). By examining the shape of a population pyramid, we can better understand the health conditions/outcomes of a population. Therefore, the shape of a population pyramid should be determined before making any plans to reduce health disparities between different racial/ethnic groups. For example, targeting a chronic disease of the elderly in a population that is predominately young, would have little impact on the mortality disparities of that population.

The shape of a pyramid changes slower than health outcomes for individuals in the population. Individual changes need to accumulate to affect population outcome. In general, several decades are required to change a population pyramid from one shape to another. Figure 2 depicts a time series of U.S. population pyramids from 1950 to 2050. Table 1 details the birth and death rates associated with the population pyramids from 1950 to 2000. The birth rate decreased from 24.1 per 1000 to 16.7 per 1000 from 1950 to 1990, less than a 0.2 per 1000 decrease per year. The death rate also decreased slowly from 9.6 per 1000 to 8.6 per 1000, an average decrease of 0.025 per 1000 per year (5). Therefore, given that the basic determinants of pyramid's shape, birth and death rates, change slowly over several decades, the shape of a population pyramid will take a long time to change as well.
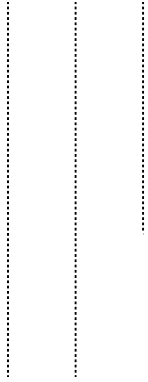
Figure 3a. 2000 Chicago Population

Figure 3b. 2000 NH-White Population
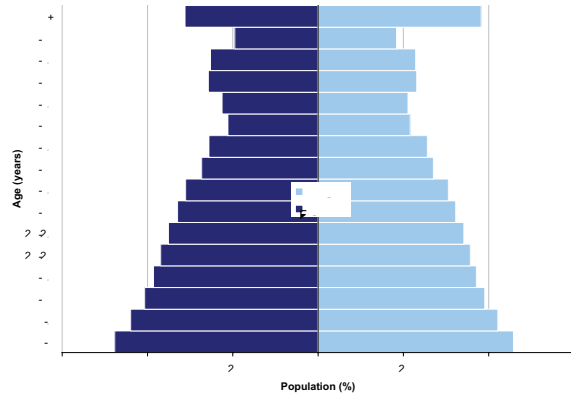
Figure 3c. 2000 NH-Black Population
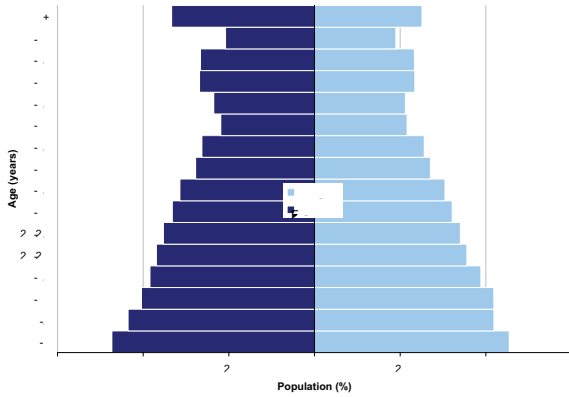
Figure 3d. 2000 Hispanic Population

Figure 3e. 2000 NH-Asian Population

2040 NH-Black Population (adjusted)   2040 NH-Black Population (unadjusted)

Figure 4b. There is a notabl2-16.8268ward shift.2(re.7(iv)0(4ly lae)0(ger percent of the pt)3.7(i)4.in older ayeagroupj3 for the NH-Blac)0(k pt)3.7(i)4./F11

2040 Hispanic Population (adjusted)   2040 Hispanic Population (unadjusted)
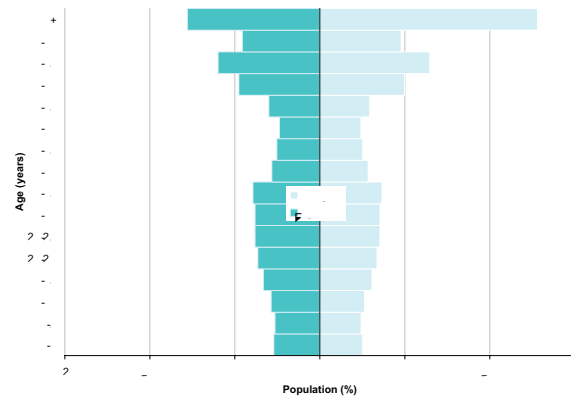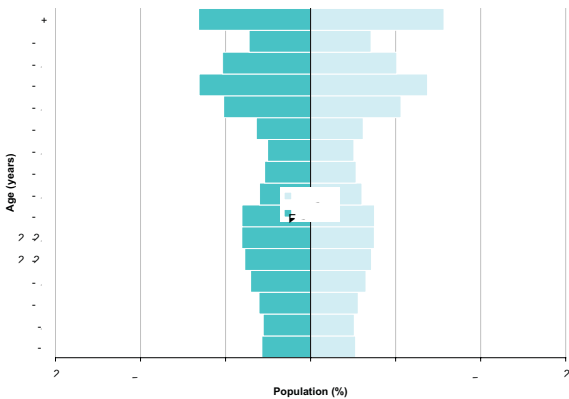
2040 NH-Asian Population (adjusted)   2040 NH-Asian Population (unadjusted)

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1. Categorize the population by sex and age groups (0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, 55-64, 65-74, and 75+).

2. Multiply published racial/ethnic-specific fertility rates to the appropriate racial/ethnic female population for each age group. This gives the number of expected births per year per age group. The number of expected births is classified into sex groups (male/ female) using the sex ratio.

3. Multiply male and female births by five.

4. Calculate age-specific deaths using the age-specific death rate of the 2000 U.S. Asian/Pacific Islander population.

5. Multiply the age-specific deaths for each sex by five.

6. Subtract the number of deaths from each age group.

7. At this step, a new population cohort is formed for 2005 with the new births becoming the 0-4 age group. Move the populations in each 5-year age group to the next higher age group e.g., 70-74 becomes 75+.

8. Steps 1-7 are repeated every five years until 2040 for each racial/ethnic group.

Appendix B. Numerical Steps in a demographic rate approach used.

1. Categorize the population by sex and age groups (0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-44, 45-54, 55-64, 65-74, and 75+).

2. Multiply published racial/ethnic-specific fertility rates to the appropriate racial/ethnic female population for each age group. This gives the number of expected births per year per age group. The number of expected births is classified into sex groups (male/ female) using the sex ratio.

3. Multiply male and female births by five.

4. Calculate age-specific deaths using the age-specific death rate for each racial/ethnic group in 2000.

5. Multiply the age-specific deaths for each sex by five.

6. Subtract the number of deaths from each age group.

7. At this step, a new population cohort is formed for 2005 with the new births becoming the 0-4 age group. Move the populations in each 5-year age group to the next higher age group e.g., 70-74 becomes 75+.

8. Steps 1-7 are repeated every five years until 2040 for each racial/ethnic group.

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