

# **ASSIGNMENT 5**

## **1) EXPLAIN WHAT YOU UNDERSTAND BY HYPOTHESIS TESTING IN BRIEF**

Hypothesis testing is a procedure for deciding whether the results of a particular research turn out to either be positive or negative regarding the decision you might think about.

In hypothesis testing we use sample data to evaluate a hypothesis about a particular subject. For example, population, Nature etc.

Hypothesis testing has two sides;

### **1)The null hypothesis ( $H_0$ )**

This is the type of hypothesis that proposes that there is no difference between certain characteristics of data generating processes.

### **2)The alternative hypothesis ( $H_a$ )**

The alternative hypothesis is the opposite of null hypothesis. For example, if the null hypothesis guesses something to be true, the alternative hypothesis guesses it to be false.

The hypothesis also involves collecting data to assess the evidence.

## **2) BRIEFLY STATE THE HYPOTHESIS YOU WOULD LIKE TO TEST IN A DATA SCIENCE PROJECT OF YOUR CHOICE.**

# **TEENAGE PREGNANCIES**

## **Information about teenage pregnancies**

As of 2019, teenage girls aged 15–19 years in low- and middle-income countries had an estimated 21 million pregnancies each year, of which approximately 50% were unintended and which resulted in an estimated 12 million births.

Based on 2019 data, 55% of unintended pregnancies among teenage girls aged 15–19 years end in abortions, which are often unsafe.

Adolescent mothers (aged 10–19 years) face higher risks of eclampsia, puerperal endometritis and systemic infections than women aged 20–24 years, and babies of adolescent mothers face higher risks of low birth weight, preterm birth and severe neonatal condition.

Data on childbirths among girls aged 10–14 are getting more widely available. Globally the adolescent birth rate for girls 10–14 years in 2022 was estimated at 1.5 per 1000 women with higher rates in sub-Saharan Africa and Latin America and the Caribbean.

Preventing pregnancy among teenagers and pregnancy-related mortality and morbidity are foundational to achieving positive health outcomes across the life course and imperative for achieving the Sustainable Development Goals (SDGs) related to maternal and newborn health.

**IN GENERAL**, Teenage pregnancy is a global problem with clearly known causes and serious health, social and economic consequences. Globally, the teenage birth rate has decreased, but rates of change have been uneven across regions. There are also enormous variations in levels between and within countries. Teenage pregnancy tends to be higher among those with less education or of low economic status. Further, there is slower progress in reducing teenage first births amongst these and other vulnerable groups, leading to increasing inequity. Child marriage and child sexual abuse place girls at increased risk of pregnancy, often unintended. In many places, barriers to obtaining and using contraceptives prevent adolescents from avoiding unintended pregnancies. There is growing attention being paid to improving access to quality maternal care for pregnant and parenting teenagers.

**WORLD HEALTH ORGANISATION (WHO)** works with partners to advocate for attention to teenage pregnancy, to build an evidence base for action, to develop policy and programme support tools, to build capacity and to support countries to address adolescent pregnancy effectively

## **THE INSIDE STORY;**

Every year, an estimated 21 million girls aged 15–19 years in developing regions become pregnant and approximately 12 million of them give birth.

Globally, teenage birth rate has decreased from 64.5 births per 1000 women (15–19 years) in 2000 to 41.3 births per 1000 women in 2023. However, rates

of change have been uneven in different regions of the world with the sharpest decline in Southern Asia, and slower declines in the Latin American and Caribbean and sub-Saharan Africa regions. Although declines have occurred in all regions, sub-Saharan Africa and Latin American Caribbean continue have the highest rates globally at 99.4 and 52.1 births per 1000 women, respectively, in 2022.

There are enormous differences within regions in teenage birth rates as well.

In the WORLD HEALTH ORGANISATION (WHO) African Region, the estimated teenage birth rate was 97 per 1000 adolescent in 2022 compared to 13.1 per 1000 adolescent girls in the European Region. Even within countries, there are enormous variations, for example in Zambia the percentage of adolescent girls aged 15–19 who have begun childbearing (women who either have had a birth or are pregnant at the time of interview) ranged from 14.9% in Lusaka to 42.5% in the Southern Province in 2018 (5). In the Philippines, this ranged from 3.5% in the Cordillera Administrative Region to 17.9% in the Davao Peninsula Region in 2017 .

While the estimated global teenage birth rates have declined, the actual number of childbirths to adolescents continues to be high. The largest number of estimated births to 15–19-year-olds in 2021 occurred in, sub-Saharan Africa (6 114 000), whereas far fewer births occurred in Central Asia (68 000). The corresponding number was 332 000 among adolescents aged 10–14 years in sub-Saharan Africa, compared to 22 000 in South-East Asia in the same year.

## Conditions in which teenage pregnancies occur

Studies of risk and protective factors related to teenage pregnancy in **low- and middle-income countries** indicate that levels tend to be higher among those with less education or of low economic status. Progress in reducing adolescent first births has been particularly slow amongst these vulnerable groups, leading to increasing inequity.

Several factors contribute to teenage pregnancies and births. First, in many societies, girls are under pressure to marry and bear children. As of 2021, the estimated global number of child brides was 650 million: child marriage places girls at increased risk of pregnancy because girls who are married very early typically have limited autonomy to influence decision-making about delaying child-bearing and contraceptive use Second, in many places, girls choose to

become pregnant because they have limited educational and employment prospects. Often in such societies, motherhood – within or outside marriage/union – is valued, and marriage or union and childbearing may be the best of the limited options available to adolescent girls.

Contraceptives are not easily accessible to teenagers in many places. Even when teenagers can obtain contraceptives, they may lack the agency or the resources to pay for them, knowledge on where to obtain them and how to correctly use them. They may face stigma when trying to obtain contraceptives. Further, they are often at higher risk of discontinuing use due to side effects, and due to changing life circumstances and reproductive intentions. Restrictive laws and policies regarding the provision of contraceptives based on age or marital status pose an important barrier to the provision and uptake of contraceptives among adolescents. This is often combined with health worker bias and/or lack of willingness to acknowledge teenagers' sexual health needs.

Child sexual abuse increases the risk of unintended pregnancies. A WHO report dated 2020 estimates that 120 million girls aged under 20 years have experienced some form of forced sexual contact. This abuse is deeply rooted in gender inequality; it affects more girls than boys, although many boys are also affected. Estimates suggest that in 2020, at least 1 in 8 of the world's children had been sexually abused before reaching the age of 18, and 1 in 20 girls aged 15–19 years had experienced forced sex during their lifetime.

The WHO report titled Violence against women prevalence estimates 2018 notes that “adolescents aged 15–19 years (24%) are estimated to have already been subjected to physical and/or sexual violence from an intimate partner at least once in their lifetime, and 16% of adolescent girls and young women aged 15–24 have been subjected to this violence within the past 12 months.”

Preventing adolescent pregnancy and childbearing as well as child marriage is part of the SDG agenda with dedicated indicators, including indicator 3.7.2, “Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1000 women in that age group,” and 5.3.1, “Proportion of women aged 20–24 years married before the age of 18 years.”

Strategies and interventions related to adolescent pregnancy have focused on pregnancy prevention. However, there is growing attention being paid to

improving access to and quality of maternal care for pregnant and parenting adolescents. Available data on access paints a mixed picture. Access to quality care depends on the geographic context and the social status of adolescents. Even where access is not limited, adolescents appear to receive a lower quality of both clinical care and interpersonal support than adult women do.

## WORLD HEALTH ORGANISATION (WHO) RESPONSE

WHO works with partners to advocate for attention to adolescents, build the evidence and epidemiologic base for action, develop and test programme support tools, build capacity, and pilot initiatives in the small but growing number of countries that began to recognize the need to address adolescents' sexual and reproductive health. As a result of these collective efforts, adolescent health has moved to the centre of the global health and development agenda. In this changed context, WHO continues its work on advocacy, evidence generation, tool development and capacity building, while working with partners within and outside the United Nations system to support countries to address adolescent pregnancy effectively in the context of their national programmes.

Teenage pregnancy is a global condition with clearly known causes and serious health, social and economic consequences to individuals, families and communities. There is consensus on the evidence-based actions needed to prevent it. There is growing global, regional and national commitment to preventing child marriage and adolescent pregnancy and childbearing. Nongovernmental organizations have led the effort in several countries. In a growing number of countries, governments are taking the lead to put in place large-scale programmes. They challenge and inspire other countries to do what is doable and urgently needs to be done by now.

1. United Nations Department of Economic and Social Affairs. World Population Prospects, 2019 Revision: Age-specific fertility rates by region, subregion and country, 1950-2100 (births per 1,000 women) Estimates. Online Edition [cited 2021 Dec 10]. Available from: <https://population.un.org/wpp/Download/Standard/Fertility/>

2. Zambia Statistics Agency, Ministry of Health (MOH) Zambia, and ICF. *Zambia Demographic and Health Survey 2018*. Lusaka, Zambia, and Rockville, Maryland, USA: Zambia Statistics Agency, Ministry; 2018.

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WHAT STATISTICAL HYPOTHESIS TEST CAN BE APPLIED TO TWO SAMPLES OF CATEGORICAL DATA WITH THE SAME CATEGORIES TO DETERMINE IF THE FREQUENCY DISTRIBUTIONS ARE SIGNIFICANTLY DIFFERENT?

## A Pearson's chi-square test

A Pearson's chi-square ( $\chi^2$ ) tests, often referred to simply as chi-square tests, are among the most common **nonparametric tests**. Nonparametric tests are used for data that don't follow the assumptions of parametric tests, especially the assumption of a normal distribution.

If you want to test a hypothesis about the distribution of a **categorical variable** you use a chi-square test or another nonparametric test. Categorical variables can be nominal or ordinal and represent groupings such as species or nationalities. Because they can only have a few specific values, they can't have a normal distribution.

Parametric tests can't test hypotheses about the distribution of a categorical variable, but they can involve a categorical variable as an independent variable.

Test hypotheses about frequency distributions

There are two types of Pearson's chi-square tests, but they both test whether the observed **frequency distribution** of a categorical variable is significantly different from its expected frequency distribution. A frequency distribution describes how observations are distributed between different groups.

Frequency distributions are often displayed using **frequency distribution tables**. A frequency distribution table shows the number of observations in each group. When there are two categorical variables, you can use a specific type of frequency distribution table called a **contingency table** to show the number of observations in each combination of groups.

Example: Bird species at a bird feeder

**Frequency of visits by bird species at a bird feeder during a 24-hour period**

Bird species	Frequency
House sparrow	15
House finch	12
Black-capped chickadee	9
Common grackle	8
European starling	8
Mourning dove	6

A chi-square test (a chi-square goodness of fit test) can test whether these observed frequencies are significantly different from what was expected, such as equal frequencies.

Example: Handedness and nationality

**Contingency table of the handedness of a sample of Americans and Canadians**

	Right-handed	Left-handed
American	236	19
Canadian	157	16