



# Foundations of Public Health

## Part II: Biological Foundations for Public Health

### DNA, HEREDITY, AND DRUG RESISTANCE

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#### Introduction

Chromosomes are molecules of DNA that provide the essential genetic code for all living organisms, and it is this code that directs the synthesis of proteins that define each organism's structure and function. A basic understanding of how the genome functions is essential to many aspects of public health. Genetic factors contribute to causation of many diseases, such as breast cancer and heart disease. In addition, an understanding of genetics also enables one to understand the major threats to health as a result of the development of drug resistance. This module will provide a fundamental understanding of how genetic factors influence many aspects of health.

#### Learning Outcomes

After completing this module, the student will be able to:

- Explain how DNA encodes genetic information and the role of messenger RNA and transfer RNA.
- Explain how DNA directs protein synthesis and the roles of DNA and proteins in regulating cell function.
- Demonstrate how to predict the possible genotypes that could occur in an offspring, provided one knows the genotype of the two parents.
- Explain what a mutation is and give examples of how it might occur.
- Define the following terms:
  - Transcription and translation
  - Allele
  - Genotype
  - Phenotype
  - Homozygous vs. heterozygous
  - Dominant, recessive, and co-dominant allele