

Bio 112: Hardy-Weinberg Equilibrium Examples

General Info

- Allele frequencies: the frequency of each allele (R or r, for example) in the gene pool. The symbols p and q are used to represent these frequencies.
- Genotype frequencies: the frequency of each genotype (RR, Rr, rr for example) in the population. These are always equal to the number of individuals with a particular genotype divided by the total population size. They are sometimes equal to p^2 , $2pq$, and q^2 - only when the population is at HWE.

For a particular pair of allele frequencies (**p = 0.2 and q = 0.8 for example**), there are many possible sets of genotype frequencies that have the same allele frequencies (actually, infinitely many). This is illustrated by the 4 example populations below; all 4 of these populations have the same allele frequencies. However, given a pair of allele frequencies, there is only one set of these genotype frequencies that are at HWE. **The predictions of HWE- the frequency of RR = p^2 (0.04 in this example), the frequency of Rr = $2pq$ (0.32 in this example), and the frequency of rr = q^2 (0.64 in this example).**

Population 1

<u>Genotype</u>	<u>#</u>	<u>Observed Genotype frequency</u>	<u>#R's contributed to gene pool</u>	<u>#r's contributed to gene pool</u>
RR	0			
Rr	40			
Rr	60			
		<u>totals</u>		

1. Allele frequencies

Freq. of R = p =

Freq. of r = q =

2. Genotype frequencies

Freq. of RR =

Freq. of Rr =

Freq. of rr =

3. Compare: HWE or Not HWE

Population 2

<u>Genotype</u>	<u>#</u>	<u>Observed Genotype frequency</u>	<u>#R's contributed to gene pool</u>	<u>#r's contributed to gene pool</u>
RR	400			
Rr	0			
rr	1600			
		<u>totals</u>		

1. Allele frequencies

Freq. of R = p =

Freq. of r = q =

2. Genotype frequencies

Freq. of RR =

Freq. of Rr =

Freq. of rr =

3. Compare: HWE or Not HWE

Population 3

<u>Genotype</u>	<u>#</u>	<u>Genotype frequency</u>	<u>#R's contributed to gene pool</u>	<u>#r's contributed to gene pool</u>
RR	4			
Rr	32			
rr	64			
		<u>totals</u>		

1. Allele frequencies

Freq. of R = p =

Freq. of r = q =

2. Genotype frequencies

Freq. of RR =

Freq. of Rr =

Freq. of rr =

3. Compare HWE or Not HWE

Population 4

<u>Genotype</u>	<u>#</u>	<u>Genotype frequency</u>	<u>#R's contributed to gene pool</u>	<u>#r's contributed to gene pool</u>
RR	12			
Rr	96			
rr	192			
		<u>totals</u>		

1. Allele frequencies

Freq. of R = p =

Freq. of r = q =

2. Genotype frequencies

Freq. of RR =

Freq. of Rr =

Freq. of rr =

3. Compare: HWE or Not HWE