6.7 The Apocalypse

In the new post-apocalyptic world, the world queen is desperately concerned about the birth rate. Therefore, she decrees that all families should ensure that they have one girl or else they face massive fines. If all families abide by this policy-that is, they have continued to have children until they have one girl, at which point they immediately stop-what will the gender ratio of the new generation be? (Assume that the odds of someone having a boy or a girl on any given pregnancy is equal.) Solve this out logically and then write a computer simulation of it.

Every family must have 1 girl, how many boys?

Sequence	# of Boys	Probability	# of Boys * Probability
G	0	1/2	0
BG	1	1/4	¼ → 32/128
BBG	2	1/8	2/8 → 32/128
BBBG	3	1/16	3/16 → 24/128
BBBBG	4	1/32	4/32 → 16/128
BBBBBG	5	1/64	5/64 → 10/128
BBBBBBG	6	1/128	6/128 → 6/128

(32 + 32 + 24 + 16 + 10 + 6) / 128 → **120 / 128**

So for each family that has one girl, we will have on average one boy.

The Birth Policy is therefore ineffective. How?

Even though there can be families that contribute a lot of boys like BBBBBBG, this outcome has low probability, and would be offset by higher probability of families with NO boys.

The gender ratio continues to be 50% girls and 50% boys.

This makes sense. Government policy does not change mother nature's inherent birth ratios.