

CHAPTER 5 PROJECT

Financing Health Care and Long-Term Wellness Costs

You are a research assistant for your university's public health department, helping investigate how families plan financially for health-related expenses. The study examines how compound interest, annuities, and loan structures affect a family's ability to cover costs like health savings accounts, medical school debt, nursing home care, and disability insurance. You will use simple and compound interest, present and future value of annuities, and loan amortization to analyze realistic health-finance scenarios.

1. A parent opens a Health Savings Account (HSA) with a \$2000 deposit when their child is born. The account earns 3.8% compounded annually. Calculate the balance when the child turns 18 using compound interest. Then calculate what the balance would be with simple interest at the same rate. What is the dollar difference, and what does it illustrate about the length of time investments are held before accessing the funds?
2. A nursing student takes out a \$45,000 student loan at 5.5% simple interest for 10 years. Calculate the total interest and the total amount owed at the end of 10 years. Then recalculate assuming the same rate compounded monthly. How much more does the student owe under compound interest?
3. After graduating, the nurse begins contributing \$200 per month to a retirement health fund earning 5.4% compounded monthly. How much will the fund contain after 30 years? Use the future value of an ordinary annuity formula. How much of the total is contributions versus interest?
4. A hospital offers its employees two disability insurance savings plans. Plan A requires a lump sum of \$25,000 deposited today into an account earning 4.2% compounded quarterly. Plan B requires monthly deposits of \$120 for 20 years into an account earning 4.2% compounded monthly. Calculate the future value of each plan after 20 years. Which accumulates more?
5. A family needs to set aside money now to cover an elderly parent's assisted living costs. The facility charges \$4500 per month. If the family can earn 4.8% compounded monthly on their savings, what lump sum must they deposit today to fund 5 years (60 months) of payments? Use the present value of an annuity formula.

6. The family from Question 5 is also considering two payment structures offered by the facility:

Structure 1: Pay \$4500/month for 60 months (as in Q5)

Structure 2: Pay \$4200/month for 72 months

Calculate the present value of Structure 2 at 4.8% compounded monthly. Which structure has the lower present value (i.e., costs less in today's dollars)? Why might the family still choose the more expensive option?

7. A medical school graduate has \$180,000 in student loans at 6.8% compounded monthly. She chooses a 10-year repayment plan (120 months). Calculate her monthly payment using the loan amortization formula. What is the total amount she will pay? How much is total interest?
8. The same graduate from Question 7 considers an income-driven plan with lower payments of \$1200/month at the same 6.8% rate. How many months will it take to pay off the \$180,000 loan at \$1200/month? How much additional interest does the extended timeline cost compared to the 10-year plan?
9. The public health department asks you to summarize the key takeaway from your analyses. A colleague argues: "The interest rate is all that matters when choosing a financial product." Using specific examples from your work (the HSA in Q1, the retirement fund in Q3, the savings plans in Q4, and the loan options in Q7–Q8), explain why this statement is incomplete. What other factors besides the interest rate significantly affect financial outcomes? Which factor surprised you the most in terms of its impact?