Chapter 16
Fundamentals of Life Insurance

Overview
This chapter begins a block of material on several important personal risks: premature death, poor health, and excessive longevity. This chapter examines premature death and the financial services products designed to address this risk. We will consider the economic impact of premature death upon various types of families, methods of determining how much life insurance to purchase, and the various life insurance products available to address this important personal risk, including: term insurance, whole life insurance, universal life insurance, variable life insurance, and some other life insurance products.

Learning Objectives
After studying this chapter, you should be able to:

• Explain the meaning of premature death.
• Describe the financial impact of premature death on different types of families.
• Explain the needs approach for estimating the amount of life insurance to own.
• Explain the basic characteristics of term life insurance.
• Explain the basic characteristics of ordinary life insurance.
• Describe the following variations of whole life insurance: variable life insurance, universal life insurance, and variable universal life insurance.
• Describe the basic characteristics of current assumption whole life insurance.
• Define the following:
  Blackout period Needs approach
  Capital retention approach Net amount at risk
  Cash-surrender value Ordinary life insurance
  Cash-value life insurance Preferred risks
  Convertible Premature death
  Current assumption whole life Readjustment period
  Dependency period Reentry term
  Endowment insurance Renewable
  Estate clearance fund Savings bank life insurance
  Group life insurance Second-to-die life insurance
  Human life value Single-premium whole life insurance
  Indeterminate-premium whole life policy Term insurance
  Industrial (home service) life insurance Universal life insurance
  Legal reserve Variable life insurance
  Limited-payment policy Variable universal life insurance
  Modified life policy Whole life insurance
Outline

I. Premature Death
   A. Meaning of Premature Death
   B. Costs of Premature Death
   C. Declining Problem of Premature Death
   D. Economic Justification of Life Insurance

II. Financial Impact of Premature Death on Different Types of Families
   A. Single People
   B. Single-Parent Families
   C. Two-Income Earners with Children
   D. Traditional Families
   E. Blended Families
   F. Sandwiched Families

III. Amount of Life Insurance to Own
   A. Human Life Value Approach
   B. Needs Approach
   C. Capital Retention Approach
   D. Adequacy of Life Insurance for American Families

IV. Types of Life Insurance
   A. Term Insurance
   B. Whole Life Insurance
   C. Endowment Insurance

V. Variations of Whole Life
   A. Variable Life Insurance
   B. Universal Life Insurance
   C. Variable Universal Life Insurance
   D. Current Assumption Whole Life Insurance
   E. Indeterminate-Premium Whole Life Insurance

VI. Other Types of Life Insurance
Short Answer Questions

1. What costs are associated with premature death?

2. How can the purchase of life insurance be justified from an economic standpoint?

3. How do the typical life insurance needs of a single adult who has no children differ from the typical life insurance needs of a single parent?

4. What is the difference between a blended family and a sandwiched family?
5. What are the steps in calculating the human life value of the breadwinner?

6. What basic family needs are considered in the application of the needs approach?

7. How does the needs approach of determining the amount of life insurance to purchase differ from the capital retention approach?
8. Why do yearly renewable term insurance premiums increase each year? Why is yearly renewable term insurance inappropriate for providing lifetime insurance protection?

9. Many term insurance policies are “renewable” and “convertible.” Explain what is meant by these two characteristics of term insurance.

10. What is the difference between the “legal reserve” and the “cash value”? 
11. How does variable life insurance differ from traditional whole life insurance?

12. What are the major characteristics of universal life insurance? How does variable universal life insurance differ from universal life insurance?

13. How does current assumption whole life differ from indeterminate-premium whole life?
Multiple Choice Questions

Circle the letter that corresponds to the BEST answer.

1. Which statement is true with regard to the human life value approach?
   I. It crudely measures the economic value of a human life.
   II. It considers the specific needs of the family in determining the amount of life insurance to purchase.
   (a) I only
   (b) II only
   (c) both I and II
   (d) neither I nor II

2. Which of the following $100,000 yearly renewable term (YRT) policies would require the LOWEST premium?
   (a) YRT purchased by a man age 30
   (b) YRT purchased by a woman age 30
   (c) YRT purchased by a man age 60
   (d) YRT purchased by a woman age 60

3. Which statement is true with regard to yearly renewable term insurance?
   (a) premiums remain level from year to year
   (b) premiums increase at an increasing rate from year to year
   (c) the insured must demonstrate insurability to renew the coverage
   (d) yearly renewable term premiums are unrelated to the probability of death

4. An important consideration in determining the amount of life insurance to purchase is the need for income during the one- or two-year period after the death of the breadwinner. This period is called the:
   (a) blackout period
   (b) readjustment period
   (c) accumulation period
   (d) dependency period

5. All of the following are costs associated with premature death of the breadwinner EXCEPT:
   (a) loss of the family’s share of the deceased breadwinner’s future income
   (b) personal maintenance expenses of the deceased
   (c) a reduction in the family’s standard of living
   (d) additional expenses, such as funeral expenses and uninsured medical bills

6. All of the following are characteristics of variable life insurance EXCEPT:
   (a) the premium payments are flexible
   (b) the cash value is not guaranteed
   (c) the policyowner selects where the savings reserve is invested
   (d) a minimum death benefit is guaranteed, but the death benefit can be higher if the investment performance is favorable

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7. Julie purchased a life insurance policy with these characteristics: the policy was nonparticipating, the maximum premium that the insurer could charge was stated in the policy, and the insurer is permitted to adjust the premium based on anticipated future experience. What type of life insurance did Julie purchase?
   (a) current assumption whole life
   (b) indeterminate-premium whole life insurance
   (c) variable universal life insurance
   (d) industrial life insurance

8. In addition to caring for their young children, Lyle and Lynn Thomas also support Lyle’s father and Lynn’s mother. This type of family is called a:
   (a) sandwiched family
   (b) blended family
   (c) nuclear family
   (d) traditional family

9. Which statement about universal life insurance is true?
   I. Universal life allows the policyowner to vary premium payments.
   II. Universal life allows the policyowner to earn a market-based rate of return on the cash value.
   (a) I only
   (b) II only
   (c) both I and II
   (d) neither I nor II

10. The difference between the face amount of a life insurance policy and the legal reserve of the policy is called:
    (a) the human life value
    (b) the net amount at risk
    (c) the level premium
    (d) the cash value

11. One form of life insurance has a reduced premium for the first three to five years, with the premium increased after this initial period. This type of whole life insurance is called:
    (a) variable life insurance.
    (b) indeterminate-premium whole life insurance.
    (c) current assumption whole life insurance.
    (d) modified life insurance.

12. Which $50,000 life insurance policy, if purchased at age 32, would have the highest cash value when the insured was 50 years old?
    (a) whole life paid-up at age 65
    (b) 10-year level term insurance
    (c) continuous premium whole life insurance
    (d) 10-payment whole life insurance
13. Bill purchased a nonparticipating life insurance policy. The cash value was based on the insurer’s present mortality, expense, and investment experience. His premium was guaranteed for an initial period, and is “redetermined” after three years. Bill purchased:
   (a) universal life insurance
   (b) variable life insurance
   (c) current assumption whole life insurance
   (d) indeterminate-premium whole life insurance

14. Which statement about second-do-die life insurance is true?
   I. Second-to-die life insurance is often used in estate planning.
   II. Second-to-die life insurance costs less than purchasing two separate policies.
   (a) I only
   (b) II only
   (c) both I and II
   (d) neither I nor II

■ True/False

Circle the T if the statement is true, the F if the statement is false. Explain to yourself why a statement is false.

T F  1. Premature death is defined as death before reaching life expectancy.

T F  2. Yearly renewable term insurance premiums increase at an increasing rate as the insured grows older.

T F  3. Industrial life insurance is group term coverage sold to industrial workers.

T F  4. The dependency period refers to the period until the youngest child reaches age 18.

T F  5. A blended family is one in which a son or daughter with children is also supporting an aged parent or parents.

T F  6. Each family head needs exactly fives times his or her annual salary in life insurance.

T F  7. Coverage ceases after the last premium is paid on a limited-payment whole life policy.

T F  8. Preferred risks have a lower-than-average probability of death.

T F  9. The difference between the face amount of a life insurance policy and the legal reserve is the cash value.

T F  10. Under the level premium method of providing life insurance protection, premiums paid during the early years are lower than what is needed to pay death claims.

T F  11. Financial dependency is a major justification for the purchase of life insurance.

T F  12. The blackout period is the one- or two-year period following the death of the breadwinner.
Problem Set: Determining How Much Life Insurance to Purchase

1. Tom, age 32, is a bookkeeper. Tom believes that he will have average annual earnings of $80,000 per year up until he retires in 30 years. Roughly 50 percent of Tom’s average annual earnings are used to pay taxes, insurance premiums, and for self-maintenance; with the balance available for family support. Assuming a 6 percent interest rate, what is Tom’s human life value?

2. Janine would like to use the needs approach to determine if she should purchase additional life insurance. Janine’s employer provides two times each employee’s salary in group life insurance. Janine’s salary is $45,000 per year. She has the following needs that she would like to satisfy upon her death: cost of funeral/final illness ($15,000); income support for her daughter ($60,000); income support for her dependent father ($70,000) and educational funds for her daughter ($40,000). Her current assets include $6000 in a checking account and $14,000 in a mutual fund. Janine also estimates about $25,000 in Social Security survivor benefits would be payable if she died. How much additional life insurance should Janine purchase, according to the needs approach?
3. Toby is attempting to determine how much life insurance he should purchase according to the capital retention approach. Toby’s goal is to provide $20,000 in income per year before taxes to his heirs. Toby’s real estate investments currently generate $6000 per year before taxes. His preferred stock pays $2500 in dividends annually; and he has a $50,000 certificate of deposit locked-in at an interest rate of 8 percent. All of these investments will pass to Toby’s heirs upon his death. The balance of the desired cash flow will be funded through life insurance proceeds which can be invested to yield 5 percent. How much additional life insurance is required?

Case Applications

Case 1
Kelly Richards is a 35 year-old investment banker. She is single and has no dependents. While she knows a great deal about stocks and bonds, she knows little about life insurance. She met with two life insurance agents. The first agent calculated Kelly’s human life value and recommended that she purchase a $450,000 life insurance policy. The second agent used the needs approach and recommended that she purchase a $50,000 life insurance policy. Kelly is confused. Explain to Kelly how two methods of determining the appropriate amount of life insurance could produce such divergent results.
Case 2
Ron Feldman, age 24, would like to purchase life insurance. He met with an agent who handed him a schedule of premiums. As Ron started to review the premiums per thousand dollars of coverage, he noticed they increased slightly each year. After reviewing the premiums for the first ten years, Ron mentioned he needed permanent, lifetime, protection. The agent replaced the first schedule with a second schedule. On the second schedule, premiums were level annual amounts, but higher than the premiums on the first schedule. Ron believes the agent is trying to take advantage of his lack of knowledge of life insurance to sell him a higher priced policy. What would you say to Ron?

Solutions to Chapter 16

Short Answer Questions

1. A number of costs are associated with premature death. These costs include: loss of the family’s share of the breadwinner’s future earnings, costs associated with death itself (unpaid hospital bills, funeral expenses, probate and estate costs, and taxes), possible reduction in the standard of living, and noneconomic costs such as emotional distress and loss of a parental role model.

2. The purchase of life insurance can be justified economically based on financial dependency. If an individual is earning an income, and others are dependent upon the income for their well-being, life insurance can be used to replace the income.

3. A single adult with no children likely has no one financially dependent upon him or her. If no one is financially dependent, death of the single person will not create financial hardship for others. Other than a small amount of life insurance to cover costs associated with death (funeral, estate clearance, uninsured medical bills, etc.), large amounts of life insurance usually are not needed by single adults with no dependents. Premature death of the family head in a single-parent family can cause severe economic insecurity for the surviving children. There is a need for large amounts of life insurance on the family head in most single-parent families.

4. A blended family is one in which a widowed or divorced spouse with children remarries, and his or her new spouse also has children. A sandwiched family is one in which a son or a daughter with children is also supporting an aged parent or parents. Such a family is “sandwiched” between an older and younger generation, with both generations financially dependent upon them.
5. A number of steps are involved in calculating the human life value. First, the individual’s average annual earnings over the wage-earning years are estimated. Next, personal maintenance expenses, taxes, and insurance premiums are deducted in order to determine the net cash flow the individual would make available to his or her family. Then, the number of years that the individual would make this cash flow available is determined. Finally, the estimated future net cash flows are discounted back to present value and summed to determine the human life value.

6. The most important family needs that are considered include: estate clearance fund, income during the readjustment period, income during the dependency period, life income to the surviving spouse, special needs (e.g., mortgage redemption, educational fund, and emergency fund), and a retirement fund.

7. Under the needs approach, an amount of life insurance is purchased such that unfunded needs are met after the death of the breadwinner. Under this approach, the life insurance proceeds are liquidated to satisfy the needs of the surviving family members.

   The capital retention approach, as the name implies, emphasizes preservation of capital. In this approach, the income needs of the survivors are determined. These needs are then compared to the income that could be generated from the assets of the breadwinner if he or she died. If sufficient income is not available from present assets, life insurance proceeds are used to fund the difference. Enough life insurance is purchased such that the invested life insurance proceeds will provide the additional income required. Under the capital retention approach, the capital is not liquidated—only the income generated from the invested capital is used.

8. Yearly renewable term insurance premiums increase each year because the premium is determined by the probability of death at each attained age. As this form of insurance is only for one year, individual insureds must pay their pro rata share of the death claims of those who die during the year. As the probability of death increases each year, premiums must increase so the insurer has enough funds to satisfy the death claims. At older ages, the probability of death is so great that the coverage becomes unaffordable. Many insurers do not permit renewal of term insurance past a specified age, such as 65.

9. Renewable term insurance, as the name implies, permits the coverage to be put back in force again at the end of the coverage period. A major benefit of renewable term insurance is that the coverage can be placed in force again without the insured having to prove that he or she is still insurable. If term insurance is convertible, it means that the term insurance can be switched to permanent life insurance. Conversion does not require the insured to prove that he or she is still insurable. Conversion can be based on the insured’s attained age or the original age at which the term coverage was purchased.

10. The legal reserve is a liability item reflecting the excess premiums paid during the early years of a level-premium policy. The reserve steadily increases over the life of the contract. The purpose of the legal reserve is to provide lifetime protection. Because of the legal reserve, cash values become available. Cash values are a by-product of the premium payment method. Since the policyowner has paid more than actuarially required during the early years of the policy, he or she should receive something back from the insurer if the policy is surrendered.

11. Variable life insurance is fixed-premium life insurance in which death benefit and the cash value vary according to the investment experience of a separate account maintained by the insurer. With variable life insurance, the cash value is not guaranteed, as it is with traditional whole life insurance. If investment experience is favorable, the face amount of insurance is increased. If the investment experience is poor, the amount of life insurance is reduced, but it can never fall below the original face amount.
12. Universal life insurance has a number of distinguishing characteristics. These distinguishing characteristics include: unbundling of protection and savings components, two forms of coverage available, considerable flexibility concerning premiums and face value, cash withdrawals permitted, market-based interest rate paid on the savings, and favorable income tax treatment.

Variable universal life insurance is also called universal variable life insurance. It possesses all of the characteristics of universal life insurance, but with two major exceptions. With universal variable life insurance, the policyowner determines where the premiums are invested. Second, the policy does not guarantee a minimum interest rate on the cash value.

13. Current assumption whole life insurance is nonparticipating life insurance in which the cash values are based on the insurance company’s current mortality, investment, and expense experience. The death benefit is level, there’s a minimum guaranteed cash value, and the premiums vary based on the insurer’s experience. There is a guarantee that the premium will not exceed a specified amount.

Indeterminate-premium whole life insurance is also nonparticipating life insurance. This type of life insurance permits the insurer to adjust the premium based on anticipated future experience. The maximum premium that can be charged by the insurer is stated in the policy. The starting premium is lower than the maximum premium and is guaranteed for an initial period. After the initial guaranteed period expires, the insurer can increase the premium.

**Multiple Choice Questions**

1. (a) The human life value is a crude estimate of the economic value of a human life. It does not, however, consider specific family needs (e.g., mortgage payments, number of children, etc.) in determining the amount of life insurance to purchase.

2. (b) Yearly renewable term insurance premiums vary with the age and gender of the insured. Younger individuals pay less per-thousand for term life insurance than do older individuals. Women pay less for life insurance than men of the same age, given that women, on average, live longer than men.

3. (b) Yearly renewable term premiums track the probability of death. As individuals grow older, the probability of death increases at an increasing rate, hence yearly renewable term insurance premiums also increase at an increasing rate.

4. (b) The one- or two-year period following the death of the breadwinner is known as the readjustment period.

5. (b) The personal maintenance expenses of the deceased are not a cost of premature death. Indeed, following premature death, the personal maintenance expenses of the deceased individual are no longer incurred.

6. (a) Premium payments are fixed, not flexible, with variable life insurance. The other choices listed are characteristics of variable life insurance.

7. (b) Julie purchased an indeterminate-premium whole life policy. This nonparticipating policy permit the insurer to adjust premiums (within limits) based on anticipated future experience.

8. (a) This type of family is called a sandwiched family. A middle generation is supporting both younger and older dependents.
9. (c) Both statements are true. Premium payment flexibility is a characteristic of universal life insurance. This form of life insurance also permits the policyowner to earn a rate of return tied to some market-based index.

10. (b) The net amount at risk is the difference between the face amount and the legal reserve.

11. (d) The type of life insurance described is called modified life insurance.

12. (d) The 10-payment life whole life insurance policy is paid-up. All the premiums required for the 10-payment, whole life insurance policy have been paid by the time the insured is 42 years old. Paid-up policies of the same face value have a higher cash value than policies of the same face value that are not paid-up.

13. (c) Bill purchased current assumption whole life insurance. The premium is based on the current experience of the insurer. This policy is somewhat similar to indeterminate-premium whole life, however indeterminate-premium policies base the premium on anticipated future experience rather than actual current experience.

14. (c) Both statements are true. Estate liquidity is often needed upon the death of the second spouse, and this type of life insurance is well-suited for this contingency. As only one death benefit is paid, the insurance costs less than purchasing two separate policies.

True/False

1. F Premature death can be defined as death of the family head with outstanding, unfulfilled, financial obligations.

2. T

3. F Industrial life insurance is individual, cash value, life insurance. The coverage is sold in low face amounts, with the premiums collected at the insured’s home.

4. T

5. F A blended family is one in which a divorced or widowed spouse with children remarries, and the new spouse also has children.

6. F Each family head needs an amount of life insurance necessary to provide financial security to his or her family in case of premature death. For some families, that amount is significant. Other families may need little, if any, life insurance.

7. F Coverage remains in force for all of life. For example, if someone purchases a 20-payment whole life insurance policy at age 30, the coverage remains in force past age 50, when the last premium payment is due.

8. T

9. F The difference between the face amount of a life insurance policy and the legal reserve is called the net amount at risk.
10.  **F** Under the level premium method, premiums paid in early years are greater than what is needed to pay death claims. This over-payment in early policy years is used to help pay death claims in later policy years while holding the premium level.

11.  **T**

12.  **F** The one- or two-year period following the death of the breadwinner is called the readjustment period.

**Problem Set**

1.  Tom’s average annual earnings are estimated to be $80,000. Of this amount, 50 percent ($40,000) will go for taxes and personal maintenance expenses, the remaining 50 percent ($40,000) will be available for the family. It is assumed that Tom will retire in 30 years and that 6 percent is the appropriate discount rate.

To calculate the human life value, the present value of $40,000 per year for 30 years must be determined, assuming a 6 percent discount rate. Future cash flows must be discounted because dollars today are worth more than dollars in the future. Dollars today can be invested to earn a return, and we must take this fact into consideration in our calculation.

The formula for the present value of an ordinary annuity is:

\[
\text{Annuity Payment} \times \text{Present Value Annuity Factor} = \text{Present Value of the Annuity}
\]

The formula for the present value annuity factor is:

\[
\frac{1-(1+i)^{-n}}{i} = \text{Present Value Annuity Factor}
\]

where “i” is the interest rate and “n” is the number of payments. It should be noted that the present value annuity factor can also be obtained from an interest rate factor table. Most introductory finance textbooks include tables that provide these factors.

Substituting 6 percent for i and 30 for n:

\[
\frac{1-(1.06)^{-30}}{0.06} = \text{Present Value Annuity Factor} = 13.7648
\]

This factor is multiplied by the $40,000 net cash flow to arrive at the human life value:

\[
$40,000 \times 13.7648 = $550,532
\]

The problem could also be solved using a financial calculator. You would input $40,000 as the payment, 30 for “n,” and 6 percent interest. Then you would compute the present value. Using formulas, tables, or a financial calculator, the result is the same.
2. The financial needs that Janine wishes to satisfy include:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of funeral/final illness</td>
<td>$15,000</td>
</tr>
<tr>
<td>Income support—daughter</td>
<td>$60,000</td>
</tr>
<tr>
<td>Income support—father</td>
<td>$70,000</td>
</tr>
<tr>
<td>Educational fund—daughter</td>
<td>$40,000</td>
</tr>
<tr>
<td>Total financial needs</td>
<td>$185,000</td>
</tr>
</tbody>
</table>

If Janine were to die today, her employer-provided life insurance, mutual fund, checking account, and Social Security survivor benefits would be available to meet some of the needs:

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checking account</td>
<td>$6000</td>
</tr>
<tr>
<td>Mutual fund</td>
<td>$14,000</td>
</tr>
<tr>
<td>Employer-provided life insurance</td>
<td>$90,000</td>
</tr>
<tr>
<td>Social security survivor benefits</td>
<td>$25,000</td>
</tr>
<tr>
<td>Total funds available</td>
<td>$135,000</td>
</tr>
</tbody>
</table>

The difference between the financial needs and the funds available to meet the needs is the additional amount of life insurance that Janine should purchase:

Additional life insurance needed …………………$50,000

3. Toby’s goal is to provide $20,000 per year to his family if he dies. Currently, the following cash flow would be available:

<table>
<thead>
<tr>
<th>Income source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real estate investment income</td>
<td>$6000</td>
</tr>
<tr>
<td>Preferred stock dividends</td>
<td>$2500</td>
</tr>
<tr>
<td>CD interest ($50,000 × 0.08)</td>
<td>$4000</td>
</tr>
<tr>
<td>Total income currently available</td>
<td>$12,500</td>
</tr>
</tbody>
</table>

So Toby must provide an additional $7500 ($20,000 − $12,500) in pre-tax income through invested life insurance proceeds. Assuming that life insurance proceeds can be invested to provide a 5 percent return, we can determine how much life insurance is needed:

\[
5\% \times \text{Life Insurance Proceeds} = 7500
\]

Dividing both sides by 5 percent (.05), we obtain:

\[
\text{Life Insurance Proceeds} = 150,000
\]

Therefore, Toby should purchase $150,000 of life insurance. Again, recall that under the capital retention approach the capital is not liquidated.
Case Applications

Case 1
The two methods the agents used to determine how much life insurance to purchase are based on different sets of assumptions. The human life value calculates the present value of the net contribution the breadwinner would have made available to his or her family. The specific needs of the family are ignored—the focus is on the future net cash flows that the individual could earn. A successful, young, investment banker could look forward to many years of high earnings, so the $450,000 human life value is not surprising.

The needs approach looks at an individual’s current needs and objectives, rather than projected future earnings. We know that Kelly is an investment banker, that she is single, and that she has no dependents. Given that she is single and has no dependents, there is no one who will experience economic hardship if Kelly dies. She may have some employer-provided life insurance and some private savings to address most of her needs. So, according to the needs approach, little additional life insurance is required.

Case 2
The first schedule the agent gave Ron was obviously a yearly renewable term insurance schedule. Given that Ron is 24 years old, there would only be a slight increase in premiums each year during the early coverage years. When Ron mentioned that he needed lifetime protection, the agent switched to a level-premium schedule. Through level premiums, lifetime protection can be made affordable. Ron is bothered by the fact that the level premiums exceeded the yearly renewable term premiums. Ron, however, did not see the complete yearly renewable term schedule. In later years, the term premium would be far greater than the level premium. Yearly renewable term premiums increase at an increasing rate, rendering this method inappropriate if the goal is lifetime protection.