The Surgeon General's Report on

Bone Health and Osteoporosis

what it means to you

This public document was originally prepared by the U.S. Department of Health and Human Services under the direction of the Office of the Surgeon General to make information in *The 2004 Surgeon General's Report on Bone Health and Osteoporosis* available in plain language to improve health literacy on this topic. Health literacy is the ability of an individual to access, understand, and use health-related information and services to make appropriate health decisions.

Strong bones begin in childhood. With good habits and medical attention when needed, we can have strong bones throughout our lives. People who have weak bones are at higher risk for fractures.

You can improve your bone health by getting enough calcium, vitamin D, and physical activity. If you have osteoporosis or another bone disease, your doctor can detect and treat it. This can help prevent painful fractures.

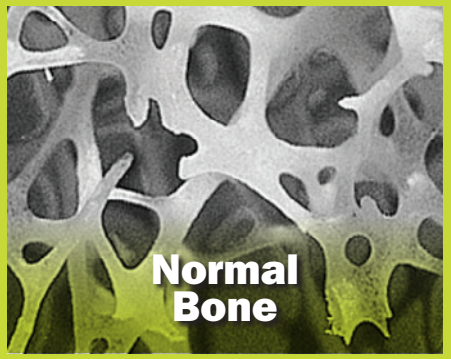
> “…with good habits and medical attention when needed, we can have strong bones throughout our lives.”

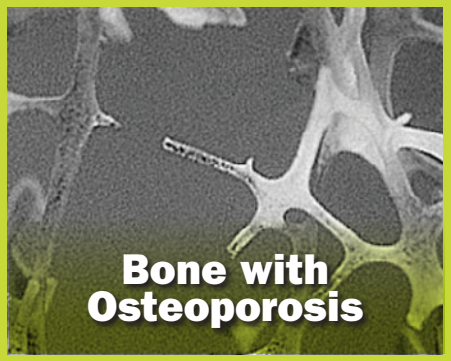
“Bones may begin to weaken early in life. Prevent this with a healthy diet and the right kinds of physical activity.”

Why Healthy Bones Are Important to You

Strong bones support us and allow us to move. They protect our heart, lungs, and brain from injury. Our bones are also a storehouse for vital minerals we need to live. Weak bones break easily, causing terrible pain. You might lose your ability to stand or walk. And as bones weaken, you might lose height.

Silently and without warning, bones may begin to weaken early in life if you do not have a healthy diet and the right kinds of physical activity. Many people already have weak bones and don’t know it. Others are making choices that will weaken their bones later.





Osteoporosis causes weak bones.

There are several kinds of bone disease. The most common is osteoporosis. In this disease, bones lose minerals like calcium. They become fragile and break easily. With osteoporosis, your body's frame becomes like the frame of a house damaged by termites. Termites weaken your house like osteoporosis weakens your bones. If you have severe fractures from osteoporosis, you risk never walking again. Weak bones can break easily. This can be fatal.

Fragile bones are not painful at first. Unfortunately, most people don't realize they have weakened bones until one breaks. By that time, it is hard to make your bones strong again.

The good news is that you are never too old or too young to improve your bone health. There are many things you can do to keep bones strong and prevent fractures. At all ages, a diet with enough calcium and vitamin D, together with weight-bearing and resistance exercises, can help prevent problems later. You can work with your doctor to check out warning signs or risk factors. When you are older, you can have your bones tested and take medicine to strengthen them.

"…you are never too old or too young to improve your bone health."

"Staying active helps strengthen bones."

Don't Risk Your Bones

Many things weaken bones. Some are outside your control. If you have a family member who has bone problems, you could also be at risk. Some medical conditions can also make you prone to bone disease.

There are some things you can control:

- **Get enough calcium and vitamin D** in your diet at every age.
- **Be physically active.**
- **Reduce hazards in your home** that could increase your risk of falling and breaking bones.
- **Talk with your doctor about medicines** you are taking that could weaken bones, like medicine for thyroid problems or arthritis. Also talk about ways to take medicines that are safe for bones. Discuss ways to protect bones while treating other problems.
- **Maintain a healthy weight.** Being underweight raises the risk of fracture and bone loss.
- **Don't smoke.** Smoking can reduce bone mass and increase your risks for a broken bone.
- **Limit alcohol use.** Heavy alcohol use reduces bone mass and increases your risk for broken bones.

FAST FACT

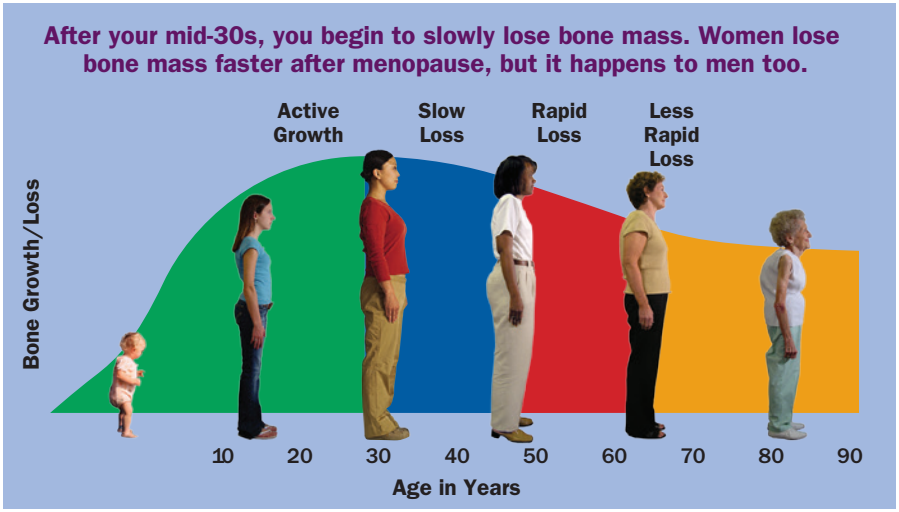
Many types of physical activity can contribute to bone health, but most people are not active enough.

Bones Are Not What You Think They Are

When you think of bones, you might imagine a hard, brittle skeleton. In reality, your bones are living organs. They are alive with cells and flowing body fluids. Bones are constantly renewed and grow stronger with a good diet and physical activity.

The amount of calcium that makes up your bones is the measure of how strong they are. But your muscles and nerves must also have calcium and phosphorus to work. If these are in short supply from foods you eat, your body simply takes them from your bones.

Each day calcium is deposited and withdrawn from your bones. If you don't get enough calcium, you could be withdrawing more than you're depositing. Our bodies build up calcium in our bones efficiently until we are about 30 years old. Then our bodies stop adding new bone. But healthy habits can help us keep the bone we have.



"Do you spend your free evenings on the sofa or taking a walk?"

> "The most common breaks in weak bones are in the wrist, spine, and hip."

When Bones Break

There is some natural bone loss as women and men age. As we grow older, bones can break or weaken if we don't take steps to keep them strong. The most common breaks in weak bones are in the wrist, spine, and hip.

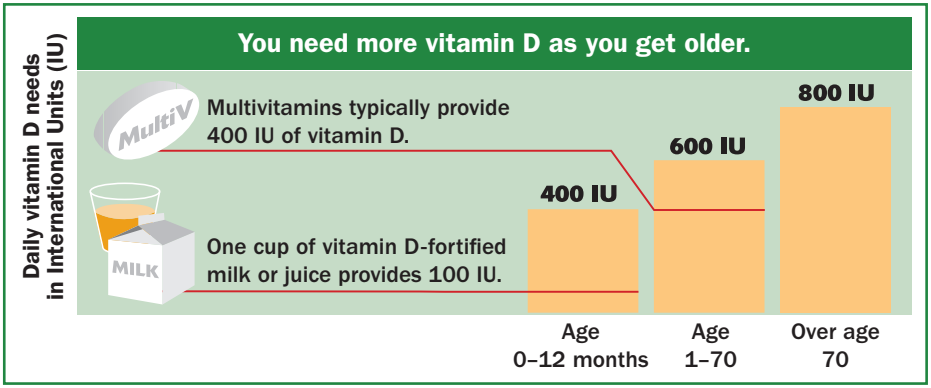
Broken bones in your spine can be painful and very slow to heal. People with weak bones in their spine gradually lose height and their posture becomes hunched over. Over time a bent spine can make it hard to walk or even sit up.

Broken hips are a very serious problem as we age. They greatly increase the risk of death, especially during the year after they break.

People who break a hip might not recover for months or even years. Because they often cannot care for themselves, they are more likely to have to live in a nursing home.

Tips for keeping bones strong

- Calcium is found in foods like milk, leafy green vegetables, and soybeans. Enjoy snacks of yogurt and cheese to increase your calcium. You can also take calcium supplements or eat food specially fortified with calcium.
- Your body needs vitamin D to absorb calcium. Make sure you get enough vitamin D from your diet, sunlight, or supplements.
- Like muscle, bone is living tissue that responds to exercise by becoming stronger. Even simple activities like walking and stair climbing can help strengthen your bones.



"If you have any kind of a fracture after age 50, talk to your doctor about getting your bone density checked."

You Could Be at Risk

Too many of us assume we are not at risk for bone loss or fractures. We believe that if we haven't had any signs of bone damage, then our bones are strong. Because there are no obvious warning signs, even doctors often miss signs of the problem. Most of us have our blood pressure and cholesterol checked for heart health. Testing bone density is an important way to check for bone health.

The risk of osteoporosis is highest among women. It is also higher for whites and Asians than other groups. However, it's important to remember that it is a real risk for older men and women of all backgrounds.

Here are some clues that you are at risk:

- Your older relatives have had fractures.
- You have had illnesses or have been on medications that might weaken bones.
- You are underweight.

That's why it is important to know the risks for poor bone health at all ages. There are many "red flags" that are signs that you are at risk for weak bones. (See page 19 for a checklist.) In addition, your calcium and vitamin D intake, level of physical activity, and medications should all be evaluated.

Why being active makes your bones strong

When you jump, run, or lift a weight, it puts stress on your bones. This sends a signal to your body that your bones need to be made stronger. New cells are added to strengthen your bones. If you are right-handed, the bones in your right arm are slightly larger and stronger from the extra use.

Bone Up on Your Diet

Calcium

To keep your bones strong, eat foods rich in calcium. Some people have trouble digesting the lactose found in milk and other dairy foods, including cheese and yogurt. Most supermarkets sell lactose-reduced dairy foods. Many nondairy foods are also calcium-rich.

Vitamin D

Vitamin D helps your body absorb calcium. As you grow older, your need for vitamin D goes up. Vitamin D is made by your skin when you are in the sun. For many, especially seniors, getting enough vitamin D from sunlight is not practical. Almost all milk and some other foods are fortified with vitamin D. If you are not getting enough calcium and vitamin D in your diet, supplements can be bone savers.

Your body needs calcium and vitamin D.

If this is your age, then you need this much calcium and vitamin D each day.

	Calcium (mg)	Vitamin D (IU)
Infants 0 to 6 months	200	400
Infants 6 to 12 months	260	400
1 to 3 years	700	600
4 to 8 years	1,000	600
9 to 13 years	1,300	600
14 to 18 years	1,300	600
19 to 30 years	1,000	600
31 to 50 years	1,000	600
51- to 70-year-old males	1,000	600
51- to 70-year-old females	1,200	600
>70 years	1,200	800
14 to 18 years, pregnant/lactating	1,300	600
19 to 50 years, pregnant/lactating	1,000	600

mg = milligrams; IU = International Units (40 IU = 1 mcg)

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 2010.

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Food labels tell you how much calcium and vitamin D you get per serving.

Source: U.S. Food and Drug Administration

Calcium-Rich Foods

Help your bones. Choose foods that are high in calcium. Here are some examples.

Fortified oatmeal, 1 packet, 350 mg

Sardines, canned in oil, with edible bones, 3 oz., 324 mg

Cheddar cheese, 1½ oz. shredded, 306 mg

Milk, nonfat, 1 cup, 302 mg

Milkshake, 1 cup, 300 mg

Yogurt, plain, low-fat, 1 cup, 300 mg

Soybeans, cooked, 1 cup, 261 mg

Tofu, firm, with calcium, ½ cup, 204 mg

Orange juice, fortified with calcium, 6 oz., 200–260 mg (varies)

Salmon, canned, with edible bones, 3 oz., 181 mg

Pudding, instant (chocolate, banana, etc.) made with 2% milk, ½ cup, 153 mg

Baked beans, 1 cup, 142 mg

Cottage cheese, 1% milk fat, 1 cup, 138 mg

Spaghetti or lasagna, 1 cup, 125 mg

Frozen yogurt, vanilla, soft-serve, ½ cup, 103 mg

Ready-to-eat cereal, fortified with calcium, 1 cup, 100–1,000 mg (varies)

Cheese pizza, 1 slice, 100 mg

Fortified waffles (2), 100 mg

Turnip greens, boiled, ½ cup, 99 mg

Broccoli, raw, 1 cup, 90 mg

Ice cream, vanilla, ½ cup, 85 mg

Soy or rice milk, fortified with calcium, 1 cup, 80–500 mg (varies)

Protect Your Bones at Every Age

People of all ages need to know what they can do to have strong bones. You are never too old or too young to improve your bone health.

Babies

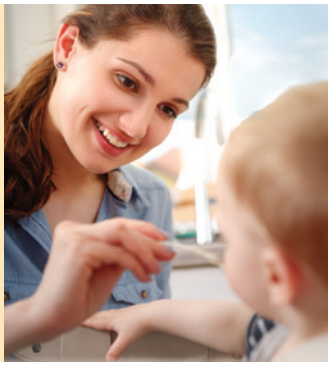
Bone growth starts before babies are born. Premature and low-birth-weight infants often need extra calcium, phosphorus, and protein to help them catch up on the nutrients they need for strong bones. Breastfed babies get the calcium and nutrients they need for good bone health from their mothers. That's why mothers who breastfeed need extra vitamin D. Most baby formula contains calcium and vitamin D.

Children

Good bone health starts early in life with good habits. While children and young adults rarely get bone diseases, kids can develop habits that endanger their health and bones. Parents can help by encouraging kids to eat healthful food and get at least an hour of physical activity every day. Jumping rope, running, and sports are fun activities that are great for building strong bones. Children need the amount of calcium equal to 3 servings of low-fat milk each day. If your child doesn't drink enough milk, try low-fat cheese, yogurt, or other foods that are high in calcium. If your child is allergic to milk or lactose intolerant, talk to your pediatrician about milk substitutes.

What if your toddler doesn't like to drink milk?

- Include some low-fat cheese chunks or yogurt for snacks.
- Make a cheesy sauce for vegetables or for a dip.
- Offer strawberry or chocolate milk as an afternoon treat.



"Your teen years are very important for strengthening bones through healthy eating and physical activity."

Teens

Teens are especially at risk for not developing strong bones because their bones are growing so rapidly. Boys and girls from ages 9 to 18 need 1,300 milligrams of calcium each day, more than any other age group. Parents can help teens by making sure they eat 4 servings of calcium-rich and vitamin D-fortified foods a day. At least 1 hour a day of physical activities—like running, skateboarding, sports, and dance—is also critical. But take note: extreme physical exercise, when combined with undereating, can weaken teens' bones. In young women, this situation can lead to a damaging lack of menstrual periods. Teens who miss adding bone to their skeletons during these critical years may never make it up.

Adults

Adulthood is a time when we need to look carefully at our bone health. As adults, we need 1,000 to 1,200 milligrams of calcium every day, depending on our age, and at least 2 hours and 30 minutes per week of moderate-intensity physical activity. Activity that puts some stress on your bones is very important.

Many women over age 50 are at risk for bone disease, but few know it. At menopause, which usually happens in women over age 50, a woman's hormone production drops sharply. Because hormones help protect bones, menopause can lead to bone loss. Hormone therapy was widely used to

FAST FACT

Children and teens should get at least an hour of physical activity every day. Adults should get at least 2 hours and 30 minutes each week.

prevent this loss, but now it is known to increase other risks. Your doctor can help advise you on protecting bone health around menopause.

Seniors

Seniors can take steps to help prevent bone problems. Physical activity and diet are vital to bone health in older adults. Calcium, together with vitamin D, helps reduce bone loss. Activities that put stress on bones keep them strong. Find time for activities like walking, dancing, and gardening. Strengthening your body helps prevent falls. Protecting yourself against falls is key to avoiding a broken hip or wrist. All women over age 65 should have a bone density test.

Seniors should also know that recent studies conclude that anyone over age 50 should increase his or her vitamin D intake to 600 International Units (IU) per day. After age 70, 800 IU per day are needed.

Adults: Keep your bones strong with physical activity.

- Physical activity at least 2 hours and 30 minutes each week
- Muscle strengthening activities on 2 days a week
- Older adults should do exercises that maintain or improve balance if they are at risk of falling

"You are buying lunch. Do you choose milk or a soft drink?"

Falls break bones

You can prevent most falls.

Falls are not just the result of getting older. But as you age, falls become more dangerous. Most falls can be prevented. By changing some of the things listed here, you can lower the chances of falling for you or someone you love.

1. Begin a regular exercise program.

Exercise is one of the most important ways to reduce your chances of falling. It makes you stronger and helps you feel better. Exercises that improve balance and coordination, like dancing and Tai Chi, are the most helpful. Consider joining an organized program at your local community center or gym.

2. Make your home safer.

- Remove things you can trip over from stairs and places where you walk.
- Remove all small rugs.
- Don't use step stools. Keep items you need within easy reach.
- Have grab bars put in next to your toilet and in the bathtub or shower.
- Use nonslip mats in the bathtub and shower.
- Use brighter light bulbs in your home.
- Add handrails and light in all staircases.
- Wear shoes that give good support and have nonslip soles.

3. Ask a health care professional to review your medicines.

Ask your doctor, nurse, pharmacist, or other health care professional to review all the medicines you are taking. Make sure to mention over-the-counter medicine, such as cold medicine. As you get older, the way some medicines work in your body can change. Some medicines, or combinations of medicines, can make you drowsy or light-headed, which can lead to a fall.

4. Have your vision checked.

Poor vision increases your risk of falling. You could be wearing the wrong glasses or have a condition such as glaucoma or cataracts that limits your vision.

Live Well, Live Strong, Live Long

The average American eats too little calcium. And nearly half of us do not get enough physical activity to strengthen our bones.

The same healthy lifestyle that strengthens your bones strengthens your whole body. You might not hear as much about bone health as other health concerns. But healthy habits are good for all your organs, including your bones.

- **Be physically active every day**—at least 60 minutes for children and teens, and 2 hours and 30 minutes each week for adults. Do strength-building, weight-bearing, and resistance exercises to build strong bones.
- **Eat a healthy diet.** Educate yourself on proper nutrition. Be aware that certain foods are naturally rich in calcium and vitamin D. Get the recommended amounts of calcium and vitamin D daily.
- **Reduce your risks of falling.** Check your home for loose rugs, poor lighting, etc. Take classes that increase balance and strength—like Tai Chi or yoga. Make stretching a part of your workout.

Even people who know better don't always do what's good for their bones. Make yourself an exception. Be aware of your risks and work to reduce them. Get help from your family and friends and your doctor, nurse, pharmacist, or other health care professional. Building healthy bones begins at birth and lasts your whole life.

"It's never too late or too early to improve your bone health."

> All women over age 65 should have a bone density test.

Your Doctor Can Help Protect Your Bones

Talk to your doctor about bone health. Together you can evaluate your risks. Some things to discuss include your current health, your diet and physical activity levels, and your family background.

Your doctor can look at your age, weight, height, and medical history. From that he or she can determine if you need a bone density test. Broken bones are a "red flag" for your doctor. If you break a bone after the age of 50, talk to your doctor about measuring your bone density. Even if you broke a bone in an accident, you might have weak bones. It is worth checking.

Your doctor might recommend a medical test called a bone mineral density test. These tests are quick (5 to 10 minutes), safe, and painless. They will give you and your doctor an idea of how strong your bones are. All women over age 65 should have a bone density test. Women who are younger than age 65 and at high risk for fractures should also have a bone density test.

Your doctor might also want to do a blood test to check for a vitamin D deficiency or abnormal calcium levels.

If your doctor finds that your bones are becoming weaker, there are things you can do to make them stronger. You can be more physically active, change your diet, and take calcium and vitamin D supplements. If your bones are already weak, there are medicines that stop bone loss. They can even build new bone and make it less likely that you will suffer a broken bone.

Your doctor might suggest medications to help you build stronger bones. To reduce the chance that you might fall, have your vision checked. When you speak to your doctor, be prepared with a list of questions and concerns. The list on the next page should help get you started.

See Your Doctor

Although osteoporosis is the most common disease that harms bones, certain other conditions can also be harmful. Your doctor can help you learn if you are at risk and can help you treat these conditions.

- Rickets and osteomalacia—Too little vitamin D causes these diseases in children and adults. They can lead to bone deformities and fractures.
- Kidney disease—Renal osteodystrophy can cause fractures.
- Paget's disease of bone—Bones become deformed and weak, which can be caused by genetic and environmental factors.
- Genetic abnormalities—Disorders like osteogenesis imperfecta cause bones to grow abnormally and break easily.
- Endocrine disorders—Overactive glands can cause bone disease.

"A 50-year-old woman breaks her wrist when she trips on a rug. Should she ask for a bone density test even if her doctor doesn't bring it up? YES!"

What to discuss with your doctor

Talk with your doctor, nurse, or other health care professional about your bone health. Use this checklist to start your discussion.

- ☐ Ask to check your risk for bone disease.
- ☐ Discuss your need for a bone density test.
- ☐ Talk about any fall, even ones in which you were not hurt. Tell him or her about any broken bones you've had.
- ☐ If you have fallen, ask about the need for a full evaluation. Tests include vision, balance, walking, muscle strength, heart function, and blood pressure.
- ☐ Go over all the medications you are taking (including over-the-counter ones). Do this at least once a year. This helps avoid dangerous drug interactions and taking higher doses of drugs than you need, which can lead to falls.
- ☐ Ask if your doctor checks vision. Annual vision checks can help eliminate bone-breaking falls.
- ☐ Know your calcium and vitamin D intake. Report your totals to your doctor.
- ☐ If you would like to try a new physical activity, ask about the best choices for you.

FAST FACT

Bone disease is often a "silent" disorder until it causes a fracture.

Are you at risk for weak bones?

Check any of these that apply to you.

- ☐ I'm older than 65.
- ☐ I've broken a bone after age 50.
- ☐ My close relative has osteoporosis or has broken a bone.
- ☐ My health is "fair" or "poor."
- ☐ I smoke.
- ☐ I am underweight for my height.
- ☐ I started menopause before age 45.
- ☐ I've never gotten enough calcium.
- ☐ I have more than two drinks of alcohol several times a week.
- ☐ I have poor vision, even with glasses.
- ☐ I sometimes fall.
- ☐ I'm not active.
- ☐ I have one of these medical conditions:
  - ☐ Hyperthyroidism
  - ☐ Chronic lung disease
  - ☐ Cancer
  - ☐ Inflammatory bowel disease
  - ☐ Chronic hepatic or renal disease
  - ☐ Hyperparathyroidism
  - ☐ Vitamin D deficiency
  - ☐ Cushing's disease
  - ☐ Multiple sclerosis
  - ☐ Rheumatoid arthritis
- ☐ I take one of these medicines:
  - ☐ Oral glucocorticoids (steroids)
  - ☐ Cancer treatments (radiation, chemotherapy)
  - ☐ Thyroid medicine
  - ☐ Antiepileptic medications
  - ☐ Gonadal hormone suppression
  - ☐ Immunosuppressive agents

If you have any of these "red flags," you could be at high risk for weak bones. Talk to your doctor, nurse, pharmacist, or other health care professional.

Resources

For more information:

For more information on your bone health, talk to your doctor, nurse, pharmacist, or other health care professional.

More information about the reports of the Surgeon General is available on the Surgeon General's website at:
https://www.hhs.gov/surgeongeneral/reports-and-publications/index.html

Medicare offers bone mass measurement (bone density) for Medicare beneficiaries who meet certain eligibility requirements and conditions for coverage.
https://www.medicare.gov/coverage/bone-mass-measurements

The Office of Disease Prevention and Health Promotion provides guidance to help Americans maintain or improve their health through physical activity.
https://health.gov/paguidelines

If you need more information about available resources in your language or in another language, please contact:

National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center
2 AMS Circle
Bethesda, MD 20892-3676
Phone: 202-223-0344
Toll free: 800-624-BONE (2663)
TTY: 202-466-4315
Fax: 202-293-2356
Email: NIHBoneInfo@mail.nih.gov
https://www.bones.nih.gov

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You are never too old or too young to improve your bone health.

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