SPECIAL REPORT

MORE THAN NORMAL AGING: UNDERSTANDING MILD COGNITIVE IMPAIRMENT

Fewer than 1 in 5 Americans (18%) are familiar with mild cognitive impairment (MCI).

Subtle cognitive changes, such as those in memory and thinking, are often a feature of aging.

What does one do if these changes are not a result of normal aging, but caused by disease — offering a potential indicator of future cognitive decline and premature death? As the size of the United States' older population grows dramatically over the next 30 years, more individuals and their physicians will confront this question.

Confronting MCI and Why It Matters

Mild cognitive impairment (MCI) causes cognitive changes that are serious enough to be noticed by the person affected and by family members and friends, but may not affect the individual's ability to carry out everyday activities. Approximately 12% to 18% of people age 60 or older are living with MCI.[738] The population of Americans age 60 and older has grown more than 30% over the past decade,[739] and the number of older individuals in the United States is expected to increase significantly by 2050 (see Prevalence section, page 19).[218,220-221] These aging individuals are potentially at higher risk of developing MCI.[48]

> *"Mild cognitive impairment (MCI) is an early stage of memory loss or other cognitive ability loss (such as language or visual/spatial perception) in individuals who maintain the ability to independently perform most activities of daily living."*[738]

MCI is characterized by subtle changes in memory and thinking. MCI is sometimes confused with normal aging, but it is not part of the typical aging process. A variety of factors can cause MCI, so it is viewed as a broad set of symptoms; this can make the diagnosis of MCI challenging for affected individuals and physicians. When a person exhibits symptoms of MCI and has biomarker evidence of the brain changes characteristic of Alzheimer's disease, they are described as having MCI due to Alzheimer's disease — a subtype of MCI.[738]

For the purposes of this Special Report, the term *MCI* refers to "syndromic" MCI of unknown cause or due to causes other than the brain changes associated with Alzheimer's disease. The term *MCI due to Alzheimer's disease* is used to describe MCI with the presence of Alzheimer's disease-related biomarkers.

Individuals with MCI may have a higher risk of developing dementia. Studies estimate that 10% to 15% of individuals with MCI go on to develop dementia each year.[48,740-741] About one-third of people with MCI develop dementia due to Alzheimer's disease within five years.[49] However, some individuals with MCI revert to normal cognition or do not have additional cognitive decline.[738,740]

Identifying which individuals with MCI are more likely to develop dementia is a major goal of current research. Distinguishing between cognitive issues resulting from normal aging, those associated with the broad syndrome of MCI, and those related to MCI due to Alzheimer's disease is critical in helping individuals, their families and physicians prepare for future treatment and care.

MCI Diagnosis and Treatment

MCI is classified as one of two types based on a person's symptoms: *amnestic* (memory issues predominate) or *nonamnestic* (other cognitive issues, such as impaired language, visuospatial abilities, or executive function, predominate).[48,738] For example, a person with amnestic MCI could forget conversations or misplace items in their table **22**

Prevalence of Mild Cognitive Impairment in Older Adults by Age

Age	Prevalence
60-64	6.7%
65-69	8.4%
70-74	10.1%
75-79	14.8%
80-84	25.2%

Created from data from Petersen et al.[48]

home, whereas a person with nonamnestic MCI could have difficulty keeping their train of thought during a conversation, finding their way around a once familiar place, or finishing everyday tasks, such as paying a bill.[742]

The number of people living with MCI increases with age (Table 22).[48] One in four individuals age 80 to 84 experience symptoms of MCI (Table 22).[48]

MCI can be caused by a variety of factors, such as medication side effects, sleep deprivation or anxiety.[740] MCI may also develop as part of neurologic, neurodegenerative, systemic or psychiatric disorders, as well as stroke or other vascular disease and traumatic brain injury.[48,742] MCI can also arise from the brain changes that occur in Alzheimer’s disease.

To diagnose MCI, physicians conduct a review of the patient’s medical history and use patient questionnaires, clinical exams and brief assessments to evaluate thinking and memory function. Cognitive assessment tools evaluate cognitive impairment by testing memory (the ability to learn and recall new information) and measuring changes in reasoning, problem-solving, planning, naming, comprehension and other cognitive skills.[38]

Sometimes, diagnosis of MCI requires ruling out other systemic or brain diseases, such as Alzheimer’s disease, Parkinson’s disease, dementia with Lewy bodies (associated with rapid eye movement sleep abnormalities), cerebrovascular disease in the blood vessels that support the brain, or prion disease or cancer (characterized by more rapid cognitive decline).[38]

Although patient-reported symptoms and the results from screening tools and clinical exams provide clues about whether a person has MCI, there is no test that can give a definitive diagnosis.[738,740]

Strongest risk factors for MCI[740]

- Increasing age.
- Having a specific form of the Apolipoprotein E gene (APOE-e4) that has been linked to Alzheimer's disease.
- Some medical conditions and other factors, such as:
  - Diabetes
  - Smoking
  - High blood pressure
  - High cholesterol
  - Obesity
  - Depression
  - Sedentary lifestyle
  - Infrequent participation in mentally or socially stimulating activities

Currently there is no specific treatment for MCI.[48,743] In some cases, physicians may be able to identify reversible causes of cognitive impairment, such as depression, medication side effects or sleep apnea. They may also recommend exercise and healthy lifestyle interventions to help improve cognitive function and quality of life.[48]

Once someone is diagnosed with MCI, the outcome can vary depending on the underlying cause and other factors. For some individuals, MCI may be a transitional state between normal cognitive aging and dementia.[738,744] In some cases, however, MCI will revert to normal cognition or remain stable. For example, MCI that is linked to use of a medication may resolve when the medication is changed or discontinued. According to new research, nearly half of people diagnosed with MCI did not progress to dementia and were cognitively normal when they were evaluated 2.4 years after their MCI diagnosis.[745]

MCI Due to Alzheimer’s Disease: A Distinct Condition

Although the symptoms of MCI due to Alzheimer’s disease are no different than syndromic MCI, MCI due to Alzheimer’s disease has a very specific underlying cause. MCI due to Alzheimer’s disease is caused by distinct biological changes that lead to the damage and death of nerve cells in the brain.[38,738] MCI due to Alzheimer’s disease is the symptomatic precursor to Alzheimer’s dementia (see Alzheimer’s Disease Continuum and Figure 1, page 9).

In fact, today, physicians can use biomarkers of Alzheimer's disease to diagnose MCI due to Alzheimer's disease. Biomarker tests measure beta-amyloid (Aβ) deposits, pathologic tau and other hallmarks of Alzheimer's disease-related neurodegeneration; these biomarkers can be detected in brain images or measured in cerebrospinal fluid (CSF).[746] Some biomarker tests, such as positron emission tomography (PET) imaging to look for beta-amyloid deposits or pathologic tau in the brain and measurement of a type of beta-amyloid called $A\beta_{42}$ in CSF are readily available to physicians, whereas others are currently limited to clinical research.[746-747]

Unfortunately, not all physicians and patients have access to biomarker testing methods, and not all patients are referred for a more thorough evaluation after MCI is diagnosed based on the symptoms. New blood tests are under development that provide simple, accurate, non-invasive detection of Alzheimer's disease biomarkers — sometimes even before symptoms appear. For now, these blood-based biomarker tests are for research use only and not available in everyday medical practice, but they hold promise for identifying patients at risk of MCI due to Alzheimer's disease earlier in the disease process.[747]

Estimates suggest that roughly 5 million Americans have MCI due to Alzheimer's disease (see Prevalence section, pages 20-21). Because MCI develops years before dementia and potentially affects individuals younger than 65, there are likely far more than 5 million Americans — of any age — with MCI due to Alzheimer's disease (see Prevalence section, pages 20 and 21). Blood-based biomarkers are expected to make it easier to identify individuals with MCI due to Alzheimer's disease as part of routine clinical practice. Until then, the true number of individuals living with MCI due to Alzheimer's disease remains unknown.

Progression to Alzheimer's Dementia Is Not Certain

Evidence suggests that over a 5- to 10-year period after a diagnosis of MCI due to Alzheimer's disease, 30% to 50% of people progress to Alzheimer's dementia.[49,586] Up to 3 in 20 (15%) people who have amnestic MCI are estimated to progress to Alzheimer's dementia in that period, and research indicates that progression to dementia may be more likely for people with this subtype of MCI due to Alzheimer's disease.[586,744]

Not everyone who has MCI due to Alzheimer's disease will go on to develop Alzheimer's dementia.

MCI Due to Alzheimer's Disease Represents a Critical Turning Point in the Alzheimer's Disease Continuum

A key consideration for managing Alzheimer's disease is determining when to intervene. Researchers have long posited that pharmacologic treatments, or medications, aimed at slowing or stopping the progression of Alzheimer's disease to dementia and preserving brain function are most effective when administered early in the disease process.

Accurate diagnosis of MCI due to Alzheimer's disease, prior to the development of dementia, is thus crucial in identifying individuals who might benefit from early treatment. Initiation of treatment earlier in the disease process may also be associated with lower overall health care costs, as progression to dementia and the need for costly assisted living, nursing home and other types of residential care is postponed (see Use and Costs of Health Care, Long-Term Care and Hospice section, page 60).

Intervening earlier also offers significant benefits for diagnosed individuals, potentially allowing them more time to live independently while enjoying a higher quality of life.

The last 20 years has marked an acceleration in the development of a new class of treatments that target the underlying biology and aim to slow the progression of Alzheimer's disease. As of the writing of this report, 104 disease-modifying treatments are being evaluated in clinical trials or are at various stages of regulatory approval, including monoclonal antibodies, such as aducanumab, donanemab, lecanemab, gantenerumab and others.[748-749] The recent accelerated approval of aducanumab by the U.S. Food and Drug Administration is generating momentum and spurring progress for the development and approval of potential therapies aimed at slowing the progression of MCI due to Alzheimer's disease and mild Alzheimer's dementia.

Understanding MCI and MCI Due to Alzheimer's Disease Today: Adult and Primary Care Physician Surveys

To better understand real-world awareness, diagnosis and treatment of MCI and MCI due to Alzheimer's disease in the United States, the Alzheimer's Association commissioned Versta Research to conduct surveys of U.S. adults and primary care physicians (PCPs). Surveys across both groups explored wide-ranging issues related to MCI and MCI due to Alzheimer's disease, including concern and awareness of MCI, attitudes about diagnosis, challenges in diagnosis, clinical management and treatment of MCI, including MCI due to Alzheimer's disease, and views on future disease-related treatments. Attitudinal differences among racial and ethnic groups were also investigated.

Key Findings

The Alzheimer's Association surveys revealed:

Americans' awareness of MCI is low.

- Fewer than 1 in 5 Americans (18%) are familiar with MCI. Familiarity with MCI is low across all racial and ethnic groups surveyed: White Americans (18%), Asian Americans (18%), Native Americans (18%), Black Americans (18%) and Hispanic Americans (17%).
- More than 2 in 5 Americans (43%) report they have never heard of MCI.
- When prompted with a description of MCI more than half of all Americans (55%) say MCI sounds like "normal aging."

When MCI and MCI due to Alzheimer's disease are described, Americans express concern, but also reluctance to see their doctor.

- Nearly one-half of Americans (47%) say they worry about developing MCI in the future. More than 4 in 10 Americans (42%) say they worry about developing MCI due to Alzheimer's disease.
- A large majority of Americans (85%) say they would want to know if they had Alzheimer's disease early, including during the MCI stage (54%) and mild Alzheimer's disease stage (31%). Reasons cited most often for wanting to know early include planning for the future (70%), allowing for earlier treatment of symptoms (70%), taking steps to preserve existing cognitive function (67%) and to understand what is happening (66%).
- Yet only 4 in 10 Americans (40%) say they would talk to their doctor right away when experiencing symptoms of MCI. More than half of Americans (57%) say they would wait until they had symptoms for a while (33%), wait until symptoms worsened (12%) or wait until others expressed concern (12%).
- Overall, almost 8 in 10 Americans (78%) express concerns about seeing a doctor in the wake of MCI symptoms. Concerns cited most often include receiving an incorrect diagnosis (28%), learning of a serious health problem (27%), receiving unnecessary treatment (26%) and believing symptoms might go away (23%).

PCPs believe it is important to diagnose MCI, including MCI due to Alzheimer's disease, but challenges in diagnosis persist.

- An overwhelming majority of PCPs surveyed say it is important to diagnose MCI (98%) and MCI due to Alzheimer's disease (90%). One-third of PCPs (35%), however, are not fully comfortable diagnosing MCI and more than one-half of PCPs (51%) say they are not fully comfortable diagnosing MCI due to Alzheimer's disease.
- Nearly all PCPs (96%) say it is important to assess patients age 60 and older for cognitive impairment, but report that they conduct assessments for just half (48%) of their patients age 60 and older.
- When making an MCI diagnosis, the most frequently cited challenges by PCPs include difficulty in differentiating MCI from normal aging (72%) and difficulty in interpreting patient reports of daily functioning (51%).
- When diagnosing MCI due to Alzheimer's disease, top challenges cited by PCPs include lack of specialists/facilities to perform diagnostic testing (51%), patient reluctance to pursue follow-up testing (49%) and PCP reluctance to diagnose a condition that has limited treatment options (47%).
- Nine in 10 PCPs (90%) say it is hard to know where MCI ends and dementia begins.

PCPs say early intervention can slow progression of cognitive decline, but many are unfamiliar with clinical trials and research advances that may help diagnose and manage MCI and MCI due to Alzheimer's disease now and in the future.

- The vast majority of PCPs (86%) say that early intervention can slow progression of cognitive decline. When MCI is detected in patients, PCPs most often recommend lifestyle changes (73%), perform laboratory testing for reversible causes of MCI (70%) and/or refer patients to a specialist (53%).
- Only 4 in 10 PCPs (40%) say they are familiar (7% very familiar and 33% somewhat familiar) with current biomarker tests to aid in the diagnosis of Alzheimer's disease, and they refer fewer than 1 in 5 patients (18%) for biomarker testing for Alzheimer's disease when MCI is detected.
- One in 5 PCPs (20%) report being familiar with clinical trials available to their patients with MCI.
- Only 1 in 4 PCPs (23%) say they are familiar with new therapies in the pipeline to address MCI due to Alzheimer's disease.

Consumers and PCPs express optimism for future Alzheimer's disease treatments.

- More than 7 in 10 Americans (73%) expect new treatments to delay the progression of Alzheimer's disease to be available within the next decade. Six in 10 Americans (60%) anticipate new treatments to stop the progression of Alzheimer's disease. More than one-half of all Americans (53%) believe there will be new treatments to prevent Alzheimer's disease.
- PCPs also expressed optimism for future Alzheimer's disease treatments. More than 4 in 5 PCPs (82%) expect there will be new treatments to delay the progression of Alzheimer's disease during the next decade. More than half of PCPs (54%) anticipate there will soon be treatments to stop Alzheimer's disease progression. Less than half (42%) anticipate new treatments to prevent Alzheimer's disease.

Survey Results

Public Awareness of MCI

The Alzheimer's Association survey of U.S. adults found that fewer than 1 in 5 Americans (18%) are familiar with MCI (Figure 18 Left, page 86). Awareness and understanding of MCI is low across all racial and ethnic groups surveyed: White Americans (18%), Asian Americans (18%), Native Americans (18%), Black Americans (18%) and Hispanic Americans (17%). More than 2 in 5 Americans (43%) report they have never heard of MCI (Figure 18 Left, page 86). Americans aged 60 and older indicated no greater awareness of MCI despite being the most likely age group to develop the disease.

When prompted with a description of MCI, more than half of Americans (55%) say it sounds like normal aging (Figure 18 Right, page 86). Black and Asian Americans (58%) were most likely to associate symptoms of MCI with normal aging, followed by Hispanic (55%), White (53%) and Native Americans (47%).

The PCP survey echoes these findings, with only 1 in 8 PCPs (13%) saying they believe that patients with whom they have discussed MCI have a strong understanding of the disease, and 8 in 10 PCPs (81%) reporting that their patients believe MCI is a part of normal aging.

Patient Concern for MCI and MCI Due to Alzheimer's Disease

Even though awareness and understanding of MCI and MCI due to Alzheimer's disease among Americans is low, they express concern when prompted with a description of both conditions.

Nearly one-half of Americans (47%) say they worry about developing MCI in the future, with 13% indicating they worry "a lot." Asian (54%) and Hispanic (52%) Americans are more likely to worry about developing MCI compared with Native (47%), White (45%) and Black Americans (44%).

Survey Design and Research Methods

Survey of U.S. Adults

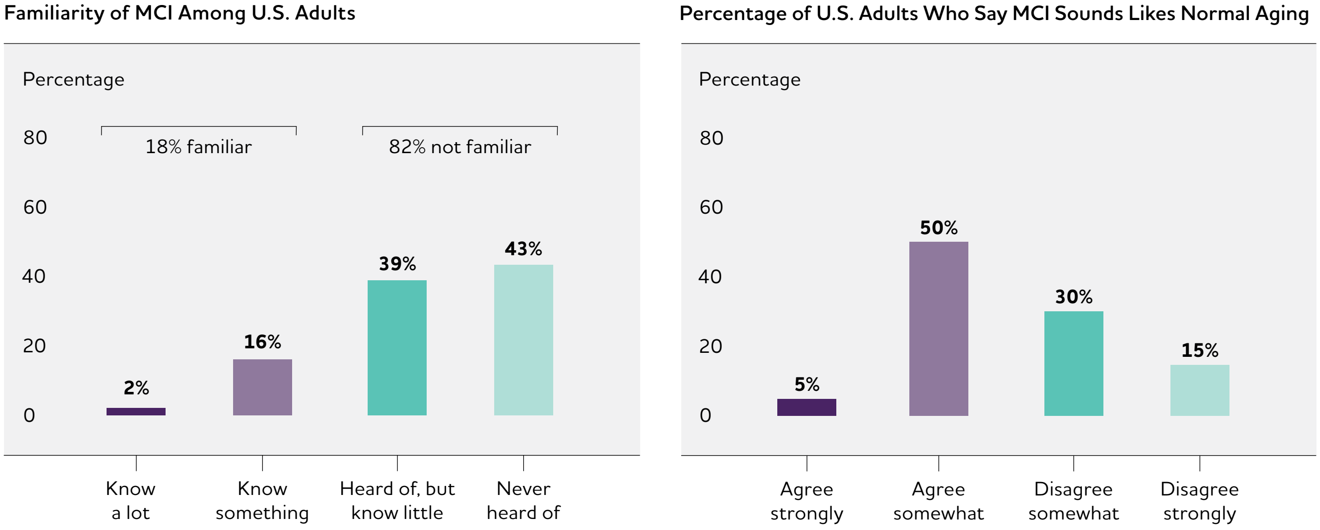
A survey of 2,434 U.S. adults age 18 and older was conducted from November 5, 2021, to December 5, 2021. Respondents included 662 who were age 60 or older, and 1,772 who were age 18 to 59. The survey included a probability sample of 2,099 Americans fielded by NORC at the University of Chicago via the AmeriSpeak® panel. It was offered online or as a phone survey in English or Spanish. Hispanic (n=328), Black (n=342), and Asian Americans (n=318) were oversampled and weighted back to their true population proportions for analysis and reporting. The probability sample of all Americans was additionally supplemented with an oversample of Native Americans (n=335) using non-probability online research methods. The Native American oversample was stratified and weighted by gender, age, income and education to match U.S. Census Bureau data.

Survey of U.S. Primary Care Physicians (PCPs)

A survey of 801 primary care physicians (M.D. or D.O.) was conducted from November 1, 2021, to November 22, 2021. Physicians were recruited via WebMD's Medscape physician network, which includes 70% of all practicing primary care physicians in the United States. Sampling was stratified and weighted by type of practice, specialty, years in practice and region using benchmarks from the American Medical Association Masterfile of all practicing physicians in the U.S. To be included in the survey, physicians had to have been in practice for at least two years and spend at least 50% of their time in direct patient care, with at least 10% of their patients being age 60 or older. Physicians included in the survey reported spending an average (mean) of 93% of their time in direct patient care, and reported that 45% of their patients were age 60 years or older. Years in practice ranged from 2 years to 54 years, with a mean of 20 years. Primary medical specialties represented were internal medicine (49%), family medicine (48%) and general practitioner (3%).

figure **18**

Familiarity and Perceptions of MCI Among U.S. Adults

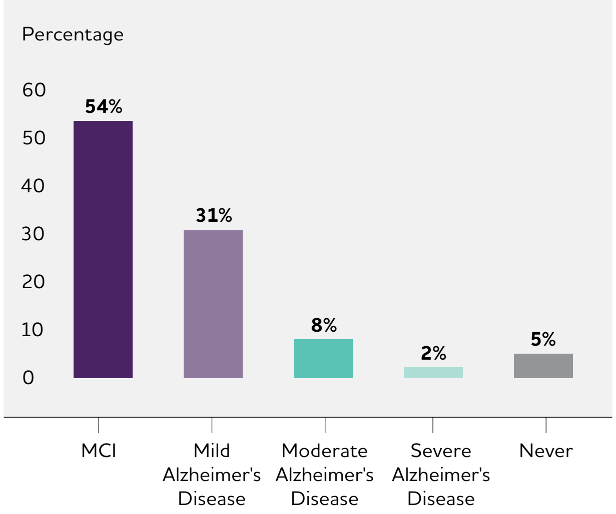


Familiarity of MCI Among U.S. Adults

Percentage of U.S. Adults Who Say MCI Sounds Likes Normal Aging

figure **19**

Stage at Which U.S. Adults Would Want to Know If They Have Alzheimer's Disease



Overall, 42% of Americans say they worry about developing MCI due to Alzheimer's disease, with 14% of individuals indicating they worry "a lot." Asian (50%), Hispanic (49%), and Black (47%) Americans are most likely to worry about developing MCI due to Alzheimer's disease, followed by Native (41%) and White Americans (39%).

Despite these concerns, a majority of Americans (85%) say they would want to know if they had Alzheimer's disease early, including during the MCI stage (54%) and mild Alzheimer's disease stage (31%) (Figure 19).

Reasons Americans cited most often for wanting to know early if they have Alzheimer's disease include planning for the future (70%), allowing for earlier treatment of symptoms (70%), taking steps to preserve existing cognitive function (67%) and being able to understand what is happening (66%) (Figure 20).

Overall, 43% of Americans cited clinical trial participation as a reason for early diagnosis of Alzheimer's disease (Figure 20). White Americans (50%) were twice as likely as Hispanic Americans (25%) to cite clinical trial participation as a reason for early diagnosis, followed by Asian (40%), Native (35%) and Black Americans (32%).

Hispanic (79%) and Black (80%) Americans are least likely to want to know if they had Alzheimer's during an earlier stage (MCI or mild Alzheimer's dementia), especially when compared with White Americans (88%). Among Asian and Native Americans, 84% say they would want to know if they had the disease during an earlier stage.

Only 15% of Americans say they would want to know if they had Alzheimer's disease during later stages of the disease (moderate/severe stage) or not at all (Figure 19). The most cited reasons for not wanting to know include: a diagnosis would be difficult to accept (34%), treatment options are limited (31%), there is no cure so it doesn't matter (28%) and people might treat me differently (26%) (Figure 21). Difficulty in accepting an Alzheimer's disease diagnosis was the most often cited reason across all racial and ethnic groups.

figure **20**

Reasons for Seeking an Early-Stage Alzheimer's Diagnosis Among U.S. Adults

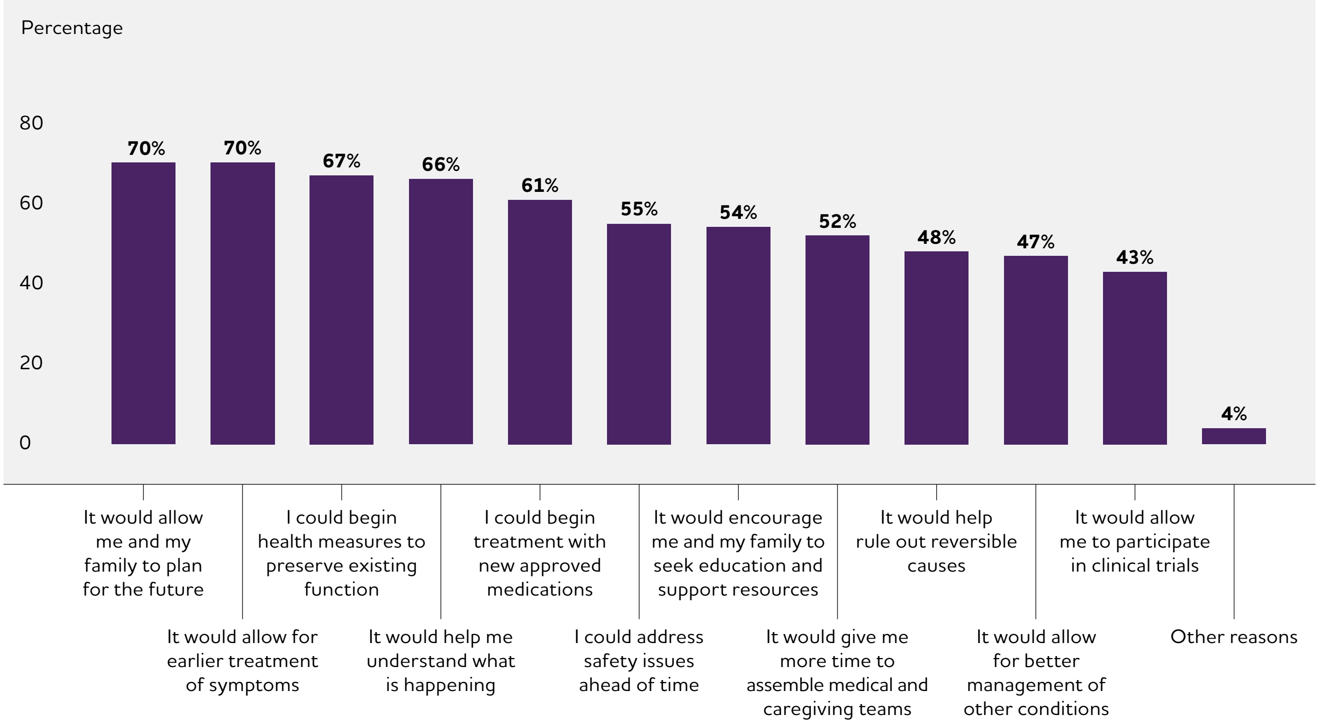


figure **21**

Reasons for Not Seeking an Early-Stage Alzheimer's Diagnosis Among U.S. Adults

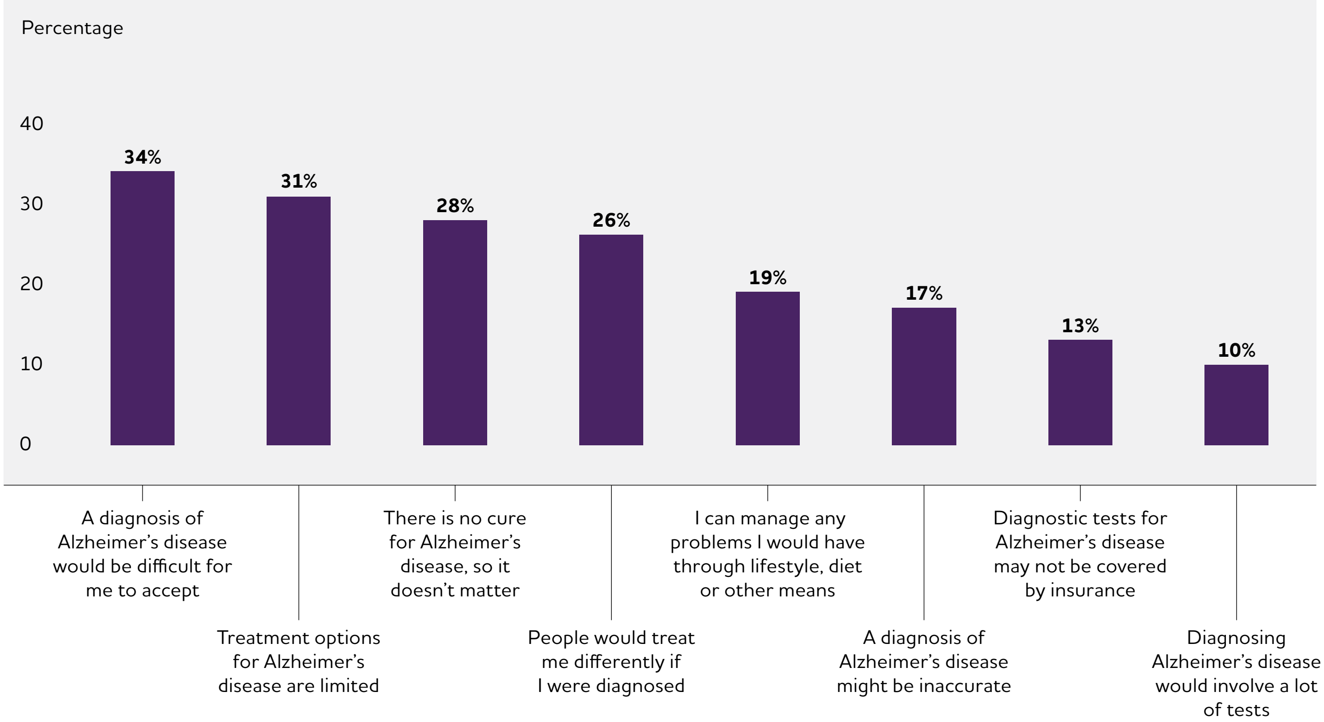
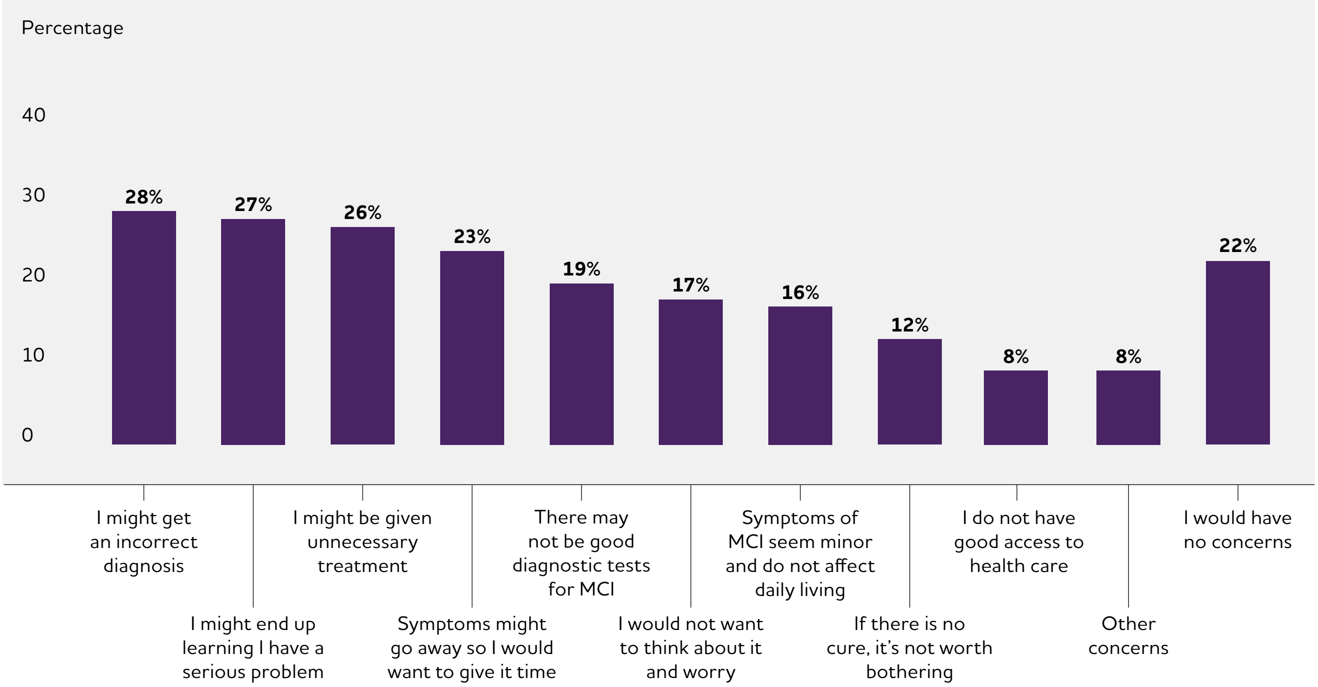


figure **22**

Concerns About Seeing a Doctor for MCI Symptoms Among U.S. Adults



Patient Reticence in Addressing Concerns About MCI and MCI Due to Alzheimer's

Most Americans (70%) say they would talk to someone if they started noticing symptoms of MCI but only 4 in 10 Americans (40%) report that they would talk to their doctor right away. More than half of Americans (57%) say they would wait until they had symptoms for a while (33%) or their symptoms worsened (12%), or wait until others expressed concern (12%). Just 2% of Americans say they would never talk to their doctor about MCI symptoms.

The Alzheimer's Association survey revealed that the decision to see a doctor when experiencing MCI symptoms is not a foregone conclusion for many individuals. In fact, almost 8 in 10 Americans (78%) say they would have concerns about seeing a doctor in the wake of MCI symptoms. Reasons for not seeing a doctor include concerns about receiving an incorrect diagnosis (28%), learning of a serious health problem (27%), receiving an unnecessary treatment (26%) and believing symptoms might go away (23%) (Figure 22).

Receiving an incorrect diagnosis was the top concern for not seeing a doctor right away for MCI symptoms among Asian (38%), Black (31%) and White Americans (27%). The top reason cited by Hispanic (27%) and Native Americans (31%) was learning they might have a serious problem. Native Americans (16%) were three times as likely as White Americans (5%) to cite having good access to health care as a concern for seeing a doctor. Hispanic (12%), Asian (11%) and Black Americans (10%) were twice as likely to cite this concern as White Americans. Surveys reported by the Alzheimer's Association in 2021 found that affordability of care, lack of insurance coverage and lack of access to community health care services were significant barriers in accessing dementia care for Hispanic, Black, Asian and Native Americans.[750]

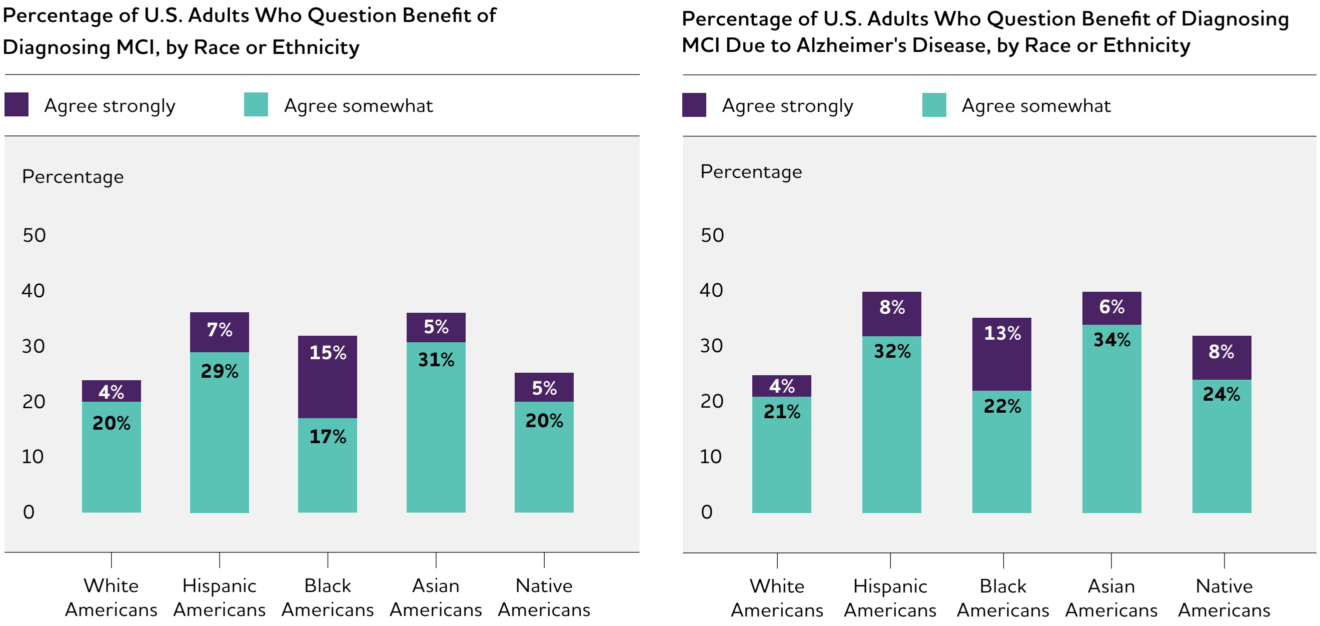
Despite their concerns and often with some delay, most Americans see value in having MCI (73%) and MCI due to Alzheimer's disease diagnosed (70%). Still, more than 1 in 4 Americans (27%) report seeing little value in having MCI formally diagnosed, while nearly 1 in 3 Americans (30%) say there is little value in having MCI due to Alzheimer's disease diagnosed. Hispanic, Black and Asian Americans expressed this view most often for both diagnoses (Figure 23).

Primary Care Physicians: On the Front Lines of Caring for Individuals With MCI

PCPs play an integral role in providing dementia care (see Workforce section, page 52). According to the Alzheimer's Association survey, 3 in 4 PCPs (75%) say they are on the front lines of providing care to patients with MCI, with two-thirds (62%) of PCPs reporting they receive questions

figure **23**

Percentage of U.S. Adults Who Question the Benefit of an MCI and MCI Due to Alzheimer's Disease Diagnosis



at least weekly from their patients about symptoms consistent with MCI. These findings parallel those from a 2020 Alzheimer's Association report in which 82% of PCPs said they were on the front lines providing dementia care.[589]

Almost all PCPs (93%) surveyed are familiar with MCI and a majority of PCPs (65%) say they are "always comfortable" or "usually comfortable" answering patient questions about MCI. Nearly as many PCPs (85%) are familiar with MCI due to Alzheimer's disease, and the majority of them (60%) are comfortable discussing with their patients how MCI can be related to Alzheimer's disease.

More than 8 in 10 PCPs (82%) report having sought information on MCI due to Alzheimer's disease during the past year. Nearly 4 in 10 (39%) have done so during the past month, with almost 1 in 10 (9%) reporting they have done so within the past week.

Patients view PCPs as a trusted source for information on MCI, with 55% of Americans reporting they would discuss MCI symptoms with their PCP before others, including their spouse (42%) or physician specialists (29%).

Primary Care Physicians: Diagnosis of MCI and MCI Due to Alzheimer's disease

Almost all PCPs surveyed say it is important to diagnose MCI (98%) and MCI due to Alzheimer's disease (90%). Nearly two-thirds of PCPs (65%) say they are comfortable diagnosing MCI, while less than half (49%) report being comfortable diagnosing MCI due to Alzheimer's disease (Table 23).

Challenges cited most frequently when making an MCI diagnosis include difficulty differentiating MCI from normal aging (72%) and difficulty interpreting patient reports of daily functioning (51%) (Figure 24, page 91).

Top challenges in making an MCI due to Alzheimer's disease diagnosis include lack of specialists/facilities to perform diagnostic testing (51%), patient reluctance to pursue follow-up testing (49%) and PCP reluctance to diagnose a condition that has limited treatment options (47%) (Figure 25, page 91).

The Alzheimer's Association survey found that fewer than 1 in 10 PCPs (7%) are "very familiar" with current biomarker tests that aid in detecting Alzheimer's disease. This finding could partially explain why it is difficult for PCPs to diagnose MCI due to Alzheimer's disease.

table **23**

Primary Care Physicians' Perceptions on Diagnosing MCI and MCI Due to Alzheimer's Disease

PCP Perceptions	MCI	MCI Due to Alzheimer's Disease
It is important to diagnose	98%	90%
It is difficult to diagnose	57%	77%
PCP is comfortable diagnosing	65%	49%

table **24**

U.S. Adults and Primary Care Physicians' Expectations for New Alzheimer's Disease Treatments During the Next Decade

Treatment type that...	U.S. Adults	Primary Care Physicians
Delays progression of Alzheimer's Disease	73%	82%
Stops progression of Alzheimer's Disease	60%	54%
Prevents Alzheimer's Disease	53%	42%

One-third of PCPs (33%) report being "somewhat familiar" with biomarker testing. Not surprisingly, fewer than 1 in 5 patients (18%) are referred for biomarker testing when MCI is detected (Figure 26, page 92).

The Alzheimer's Association survey found that nearly all PCPs (96%) say it is important to assess patients 60 and older for cognitive impairment, but they report conducting assessments for just half their patients (48%). This finding is consistent with previous Alzheimer's Association reports published in 2019 and 2020 indicating PCPs provide cognitive assessments for less than half their patients age 65 and older.[247,589]

The current challenges PCPs face when diagnosing MCI and MCI due to Alzheimer's disease are underscored by the finding that 9 in 10 PCPs (90%) say "it is hard to know where MCI ends and dementia begins."

Primary Care Physicians: Management and Treatment of MCI

The vast majority of PCPs (86%) say early intervention can slow progression of cognitive decline. When MCI is detected in patients, PCPs most often recommend lifestyle changes (73%), perform laboratory testing for reversible causes of MCI (70%) and/or refer patients to a specialist (53%) (Figure 26, page 92).

As indicated in Figure 26 (page 92), PCPs infrequently recommend testing for Alzheimer's disease biomarkers (18%). In addition, fewer than 1 in 4 PCPs (20%) report being familiar with clinical trials in MCI due to Alzheimer's disease and recommend trial participation when MCI is detected just 8% of the time. PCP referral of patients to clinical trials is much lower than the 43% of Americans who cite the potential for clinical trial participation as a reason for early diagnosis (see Figure 20, page 87).

Finally, as referenced earlier in this report, there are more than 100 disease-modifying treatments for Alzheimer's disease, including those aimed at addressing MCI due to Alzheimer's disease, under investigation in clinical trials and at various stages of regulatory approval.[748-749] Yet fewer than 1 in 4 PCPs (23%) say they are familiar with these emerging treatments to address MCI due to Alzheimer's.

Optimism for Future Treatments

Despite the devastating toll Alzheimer's disease continues to have on individuals and families across the country, both patients and PCPs express optimism that new treatments to combat Alzheimer's disease are on the horizon.

More than 7 in 10 Americans (73%) expect new treatments to delay the progression of Alzheimer's disease to be available within the next decade (Table 24). Six in 10 Americans (60%) anticipate new treatments to stop the progression of Alzheimer's disease. More than one-half of all Americans (53%) believe there will be new treatments to prevent Alzheimer's disease.

PCPs also expressed optimism for future Alzheimer's disease treatments (Table 24). More than 4 in 5 PCPs (82%) expect there will be new treatments to delay the progression of Alzheimer's disease during the next decade. More than half of PCPs (54%) anticipate there will be treatments to stop Alzheimer's disease progression, and more than 4 in 10 (42%) anticipate new treatments to prevent Alzheimer's disease.

A Path Forward: Increasing Awareness and Diagnosis of MCI and MCI Due to Alzheimer's Disease

Taken together, the Alzheimer's Association surveys provide important insights and perspectives from the American public and primary care physicians on the current state of understanding, awareness, diagnosis, and management of MCI and MCI due to Alzheimer's disease. The findings indicate improvements are needed to increase public awareness of MCI, including MCI due to Alzheimer's, and that enhanced support is needed for primary care physicians on the front lines tasked with diagnosis,

figure **24**

Primary Care Physician Challenges in Diagnosing MCI

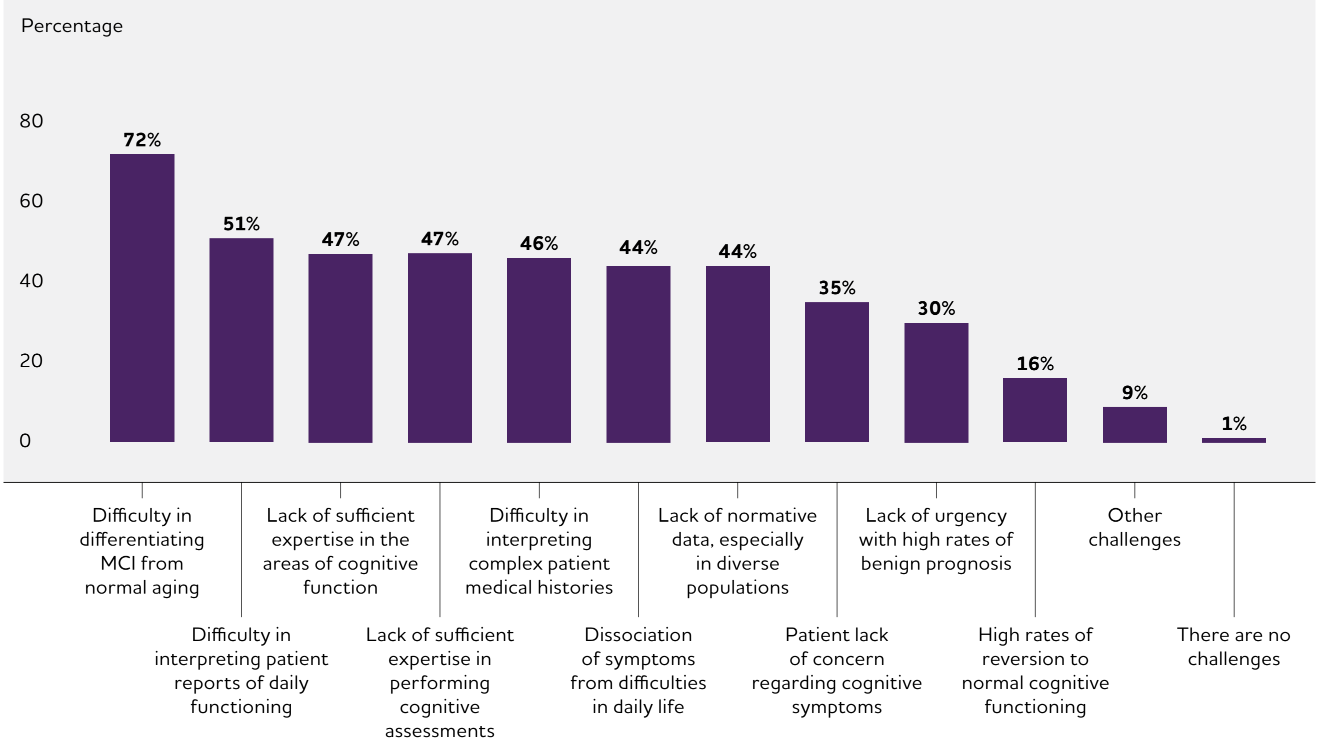


figure **25**

Primary Care Physician Challenges in Diagnosing MCI Due to Alzheimer's Disease

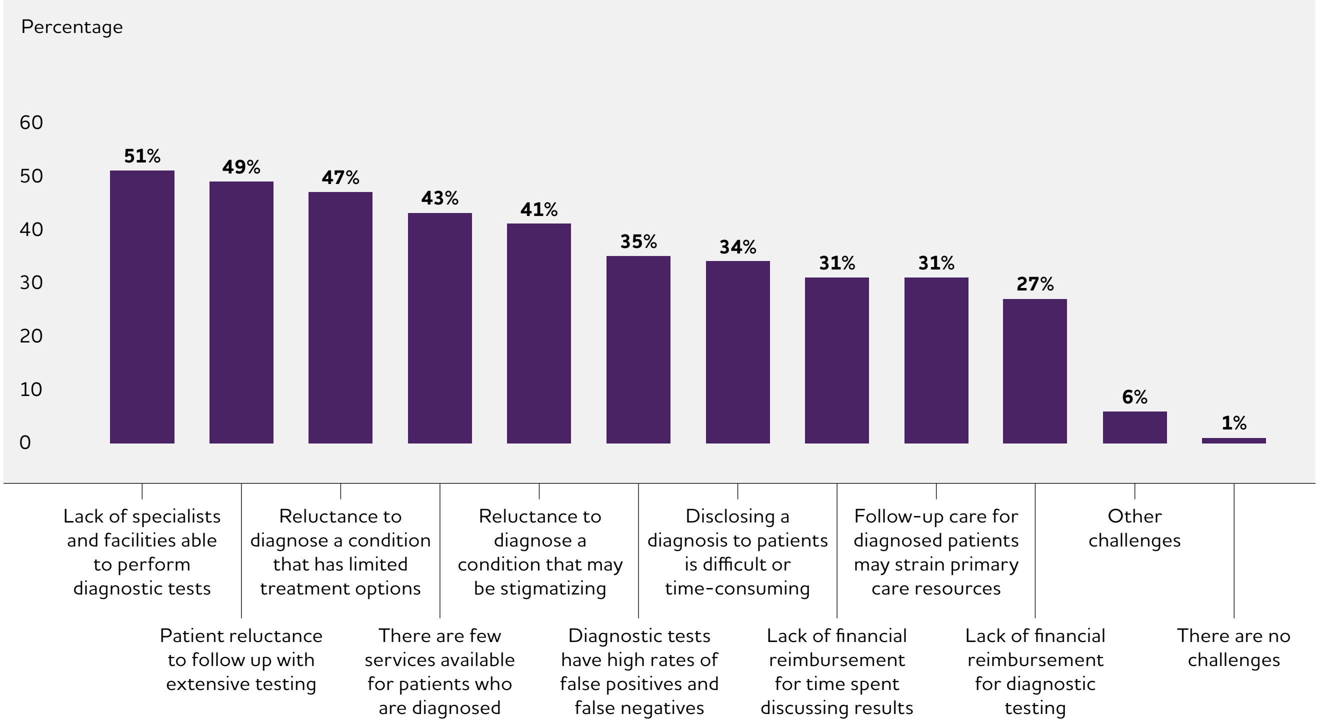
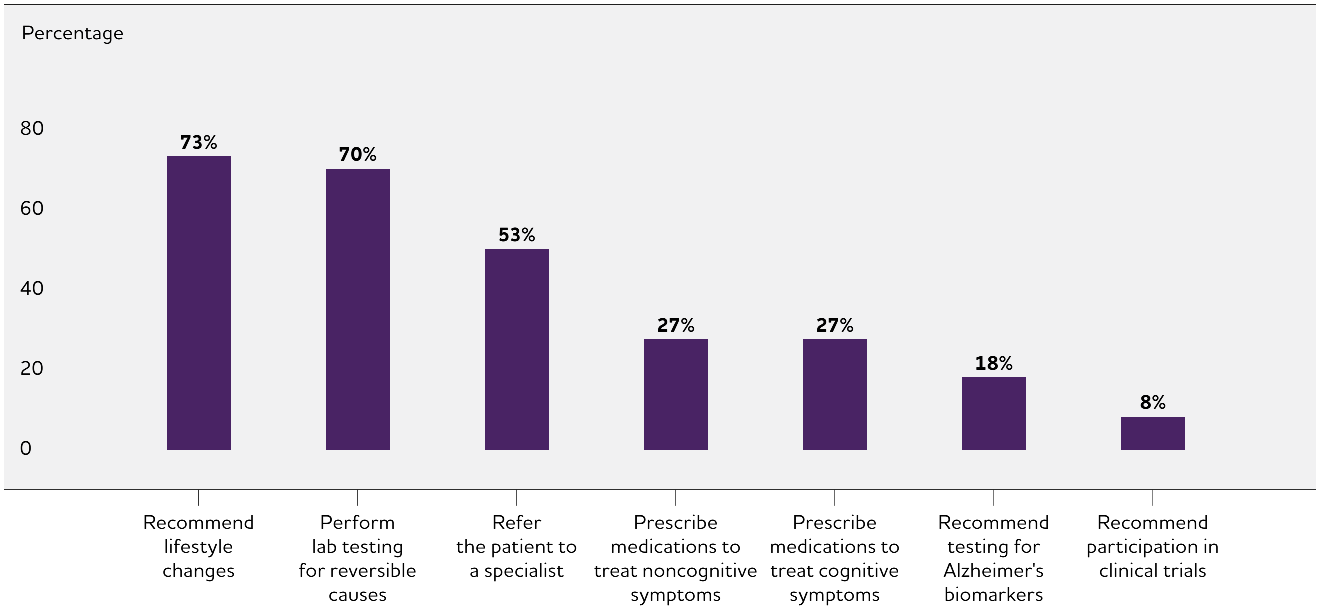


figure **26**

Steps Recommended by Primary Care Physicians When MCI Is Detected



management and treatment of MCI, including MCI due to Alzheimer's disease, and other dementias. The Alzheimer's Association proposes four broad efforts to improve the current situation:

- Promote greater public awareness by leveraging awareness campaigns and community-based disease education programs.
- Improve ease of use and uptake of cognitive assessments in the primary care setting.
- Expand primary care physicians' ability to diagnose cognitive impairment, including MCI and MCI due to Alzheimer's disease.
- Bolster public and primary care physician awareness of and patient participation in Alzheimer's disease-related clinical trials and research.

Leveraging Public Awareness Campaigns and Community-Based Disease Education Programs

Findings from the Alzheimer's Association surveys reveal that Americans have a concerning lack of awareness of MCI, MCI due to Alzheimer's disease, and the distinction between these conditions and normal aging. When Americans do have concerns about their cognitive functioning, they are often slow to act — potentially delaying or impeding diagnosis and potential intervention for MCI or MCI due to Alzheimer's disease.

Public awareness campaigns and community-based disease education programs offer two important avenues for building public awareness nationally and locally.[751] Given low consumer awareness of MCI, core messaging to public audiences within these efforts should be broad, encouraging more Americans to be proactive in recognizing early symptoms of cognitive impairment and addressing concerns with their physician.

These efforts should engage not only individuals at risk for cognitive decline, but family members as well. Close family members are typically the first to notice memory concerns or cognitive problems, yet many are reluctant to initiate a conversation with the affected individual or their physician. Touting the value and benefits of early diagnosis in messaging can help overcome reticence and rectify concerns identified in the current Alzheimer's Association survey.

Since 2019, the Alzheimer's Association has partnered with the Ad Council on a national communications campaign aimed at encouraging families to discuss cognitive concerns with each other and their doctor sooner to enable early diagnosis of Alzheimer's disease and related dementias.

The campaign features real stories of people who noticed cognitive changes in a close family member and took the first, difficult step to initiate a conversation about those changes. The campaign offers tools and resources to help families recognize early warning signs of Alzheimer's disease, provides tips for facilitating conversations about cognition, and explains benefits of early detection and diagnosis.[752] The campaign resources also include a collection of disease-related information and a discussion guide for use with doctors and health care professionals.[753]

Community-based disease education programs provide another important avenue to raise awareness about MCI, including MCI due to Alzheimer's, with the advantage that they can be tailored to reach diverse communities. As indicated in the current Alzheimer's Association survey, there are differences in how racial and ethnic groups view and respond to concerns about cognitive impairment. Creating disease-related materials and messaging that resonates with diverse communities is essential.

Improving Cognitive Assessment in Primary Care Practice

Studies indicate that detection and diagnosis of cognitive impairment or dementia can be increased two- to three-fold with routine use of brief cognitive assessments.[586] Yet findings from the current Alzheimer's Association survey indicate that primary care physicians are evaluating just under half of their patients for cognitive impairment. These findings parallel those from Alzheimer's Association surveys of primary care physicians published in 2019 and 2020.[247,589]

In recent years, the Centers for Medicare and Medicaid Services (CMS) has attempted to increase utilization of cognitive assessments in routine care by making it a requirement of the Medicare Annual Wellness Visit (AWV), reimbursing the cognitive assessment and care plan as a separate visit and at a higher dollar amount, and making the option of reimbursable telehealth evaluation permanent.[754] Three other approaches arising from this year's Alzheimer's Association survey findings that could complement these efforts to increase uptake of cognitive assessments in primary care are:

1. Implementing new assessment approaches that do not detract from the physician portion of a visit.
2. Supporting physicians with resources to equip them to more confidently perform and interpret cognitive assessments.
3. Developing and disseminating culturally appropriate assessment tools for use in diverse populations.

Rethinking Assessment Approaches

Currently, many physicians administer cognitive assessments themselves — asking patients questions, recording the answers, then interpreting the results and formulating next steps. This takes time, and not only do physicians have limited time with patients, but the cognitive assessment may also not be the priority during the visit. Time is a barrier to uptake without an easy solution. Using computerized or digital screening assessments outside of exam room time is one approach to overcome time constraints, as is using remote assessment through telehealth technology.[638] Other approaches include limiting the time it takes to conduct an assessment and involving other members of the care team to administer cognitive screenings (see Workforce section, page 52).[586,755]

Resources

Limited expertise is a frequently cited barrier to performing cognitive assessments in the literature and was raised by PCPs in the current Alzheimer's Association survey, with PCPs citing lack of expertise in areas of cognitive function (47%) and lack of sufficient expertise in performing cognitive assessments (47%) as significant challenges (Figure 24, page 91).[589,755]

Increasing PCP awareness of self-directed training resources is an important first step to help them gain confidence and comfort using cognitive assessments more regularly. Resources and information on performing cognitive assessments are available to primary care practices from numerous government and professional organizations, including:

- Centers for Medicare and Medicaid Services
- The National Institute on Aging
- The Alzheimer's Association Cognitive Assessment Toolkit
- The Alzheimer's Association Medicare Annual Wellness Visit Algorithm for Assessment of Cognition
- The Gerontological Society of America Kickstart, Assess, Evaluate, Refer (KAER) Toolkit
- The American Academy of Family Physicians Cognitive Care Kit
- Minnesota's Act on Alzheimer's® Provider Practice Tools

The Alzheimer's Association and others, including a working group of international experts on MCI and Alzheimer's disease, have published recommendations and descriptions of operationalizing cognitive assessments, including the AWV, in primary care practice to guide this process.[586,755-757]

Culturally Appropriate Assessment

Clinicians need more cognitive assessment tools for diverse and underserved populations. Studies show sensitivity to differences in age, literacy levels and cultural variation are key limitations of many cognitive tests in use today.[755,758-761]

Evidence suggests that age, number of chronic conditions and socioeconomic status may influence screening rates with cognitive assessments, and that race, ethnicity, educational level and language barriers may negatively impact the utility of cognitive assessments in discriminating between normal aging and MCI or dementia.[755,758-759] Adapting existing cognitive assessments or developing new cognitive assessments for an increasingly diverse aging population is an avenue to explore to improve early diagnosis rates among groups that are disproportionately affected by Alzheimer's disease and related dementias (see Prevalence section, page 18).[762] An example of this is a best practices guide developed by CMS to help physicians adapt cognitive assessments based on cultural considerations for screening Native Americans.[763] Having cognitive assessments that are designed specifically for historically underrepresented groups may also improve uptake in primary care practices, as these assessments could generate the normative data in diverse populations that physicians surveyed as part of this year's Special Report say they are lacking to diagnose MCI.[755]

Expand Primary Care Physicians' Ability to Diagnose Cognitive Impairment Early

Ensuring that primary care physicians and care teams are equipped to diagnose and manage MCI and MCI due to Alzheimer's disease now and in a growing aging population is imperative, especially in light of a worsening shortage of other specialists, such as geriatricians (see Workforce section). Possible future directions informed specifically by the Alzheimer's Association survey findings are described below. They include adopting new diagnostic tools as they become available, continuing to enhance primary care capacity for dementia care, and ongoing efforts to deliver more culturally-competent care (for additional recommendations, see the Workforce section, page 52).

Simplify Adoption of Future Diagnostic Tools

Low diagnosis rates for MCI due to Alzheimer's disease can be partially explained by the challenges primary care physicians report in administering diagnostic tests. The Alzheimer's Association survey found that physicians report barriers in referring their patients to specialists for diagnostic tests, must overcome patient reluctance to pursue further testing and believe existing diagnostic tests can be inaccurate (Figure 25, page 91). Some of these barriers could be overcome with research advancements that bring new diagnostic tools, such as blood-based biomarker tests, to the primary care setting. Although not yet widely available in clinical practice, eventually blood-based biomarker tests could be ordered through the primary care practice and offer another way to help detect disease early so that a patient could be referred to a specialist or monitored more closely for cognitive decline by their primary care physician.

As reported in the 2017 Special Report, "*Alzheimer's Disease: The Next Frontier*," "Alzheimer's disease exists as a continuum beginning with a phase that may only be detectable through biomarkers, moving through the dementia stage."[764] Research funded by the Alzheimer's Association and other institutions is underway to discover new biomarkers and evaluate this approach.[747,765-768] Advances in biomarker science will also help PCPs perform a differential diagnosis to rule out modifiable causes of symptoms, and ascertain when it may be appropriate to refer patients to clinical trials of new treatment options.

The Alzheimer's Association survey found that very few PCPs are familiar with current biomarker tests that aid in detecting Alzheimer's disease. Therefore, when new blood-based biomarker tests are ready for adoption in routine primary care practice, it will be important to educate physicians about appropriate use. Education can be accomplished with implementation toolkits or stepwise diagnostic algorithms that clearly explain which patients to test and when, how biomarker tests complement other tools, such as cognitive assessments and clinical exams, and how to put the results into context with other clinical findings to create a care plan.[747,755]

Continue to Enhance Primary Care Capacity for Dementia Care

Although less frequently cited than other challenges in this year's Special Report, physicians did acknowledge that they have difficulty diagnosing MCI due to Alzheimer's disease because there are few services for patients who are diagnosed, and they believe that follow-up care may strain primary care resources (Figure 25, page 91).

The Alzheimer's Association is partnering with primary care clinicians and practices to increase equitable access to timely detection, accurate diagnosis, and quality, person-centered care. In 2018, the Association launched a Project ECHO® — a highly successful telementoring program — that has connected more than 50 primary care practices with dementia care experts to enhance dementia care in underserved areas. University of Washington and West Virginia University have also launched Project Dementia and Memory Health to support primary care practices.[769-770]

In addition to work through Project ECHO, the Alzheimer's Association is partnering directly with more than 300 health systems in the United States, from community health centers to large integrated delivery networks, and offers guidance and resources for them at: alz.org/professionals/health-systems-clinicians.

Another approach to enhancing primary care capacity for dementia care is through collaborative and coordinated care programs. The UCLA Alzheimer's and Dementia Care Program, for example, uses nurse practitioners and dementia care specialists to manage the care of people living with dementia. Since launching in 2011, the program has expanded to 18 sites across the country, reducing emergency department visits, days spent in the hospital, admissions to nursing homes for long-term care and overall Medicare costs.[771]

Dedicate Sustained Effort to Improve Diversity and Inclusion in Primary Care

This year's Special Report uncovered some distinctions between racial and ethnic groups in understanding, diagnosis and management of MCI and MCI due to Alzheimer's disease. As we move forward, it is critical to recognize racial and cultural differences in how underserved and disproportionately affected populations respond to health concerns and work to eliminate barriers that may delay or prevent timely access to care and treatment.

Recommendations outlined in the Alzheimer's Association *2021 Alzheimer's Disease Facts and Figures* Special Report still hold true this year. The Alzheimer's Association survey reported in 2021 found that individuals want health care providers who reflect their racial and ethnic backgrounds.[750] A diverse, representative, culturally-competent primary care workforce could strengthen trust with underserved populations, helping them to overcome some of their reticence to seek evaluation and diagnosis of cognitive impairment, potentially reducing future disparities in dementia care.[750]

Bolstering Public Awareness and Physician and Public Participation in Clinical Trials

Low public awareness, difficulty recruiting and retaining clinical trial participants, and a lack of diversity in clinical trials are ongoing challenges that impede progress toward advancing new disease-related treatments and therapies.

Registries established at the local and national levels aim to help in the recruitment process by offering people the chance to be matched to current and future Alzheimer's disease clinical trials.[772] Examples include the Alzheimer's Prevention Registry, which is trying to enlist large numbers of people for future disease prevention trials, The Alzheimer's Association's TrialMatch, the NIH-funded ResearchMatch and the Brain Health Registry. Rolling information about registries into public awareness campaigns and community outreach efforts could be a step towards educating the public.

Grassroots community outreach has also shown some success in recruiting Alzheimer's disease clinical trial participants from the community-at-large, and could be included as part of the public awareness campaigns described previously.[772-773] Online patient communities and support groups can also serve as an avenue to awareness and recruitment.[773]

The 2021 Alzheimer's Association Special report found that a majority of Americans feel that medical research is biased against Asian, Black, Hispanic and Native Americans, which leads these underrepresented groups to be less interested in participating in clinical trials.[745]

As outlined in the same report, building relationships with community-based organizations and trusted leaders from underrepresented groups can help facilitate education and the delivery of dementia-related information and resources to these communities, including the importance of these groups' participation in clinical trials and disease research.[774]

For PCPs, awareness may not be the only reason they are not recommending and referring patients for participation in clinical trials and disease research. Some studies have found that not all physicians see value in clinical trials.[772-773] Others are hesitant to refer due to potential risks to their patients, concerns from their patients and logistical obstacles that prevent easy referral if the physician is not affiliated with an academic research institution.[772-773]

The Alzheimer's Association survey of PCPs published in 2019 found that fewer than 4 in 10 believe participation in clinical trials or other research is an important benefit of early detection of Alzheimer's disease.[247] This finding appears to still hold true today, as PCPs recommend trial participation just 8% of the time when MCI is detected (Figure 26, page 92). Education that reinforces the value and benefits of clinical trial participation is warranted.

Finally, many clinical trials today seek to include patients with preclinical Alzheimer's disease or MCI due Alzheimer's disease, highlighting a heightened need for PCP referral. Findings from the current survey indicate many PCPs do not feel they have the diagnostic tools to accurately confirm MCI due to Alzheimer's disease without referral to a specialist and follow-up testing. As outlined previously, increasing use of cognitive assessments and the potential availability of blood-based biomarkers to aid in detection and diagnosis of MCI due to Alzheimer's disease may help overcome this particular challenge.

Conclusion

The Alzheimer's Association surveys of U.S. adults and primary care physicians underscore the need for robust efforts to raise the public's awareness of MCI, including MCI due to Alzheimer's disease, while also better preparing primary care physicians to identify, diagnose and manage their patients' cognitive impairment at its earliest stages. As we wait for widespread use of biomarkers to be common practice in the clinical setting, patients and physicians share responsibility in recognizing and addressing symptoms of MCI sooner and more proactively.

Early intervention offers the best opportunity for management and treatment, allowing individuals with MCI or MCI due to Alzheimer's disease more time to plan for the future, adopt lifestyle changes that may help slow disease progression, participate in clinical trials and to live more fully, with a higher quality of life, for as long as possible.

Appendices

End Notes

A1. Activities of daily living: Everyday activities a person typically performs without assistance, including getting into and out of a bed or chair, bathing, dressing, grooming, eating and using the toilet.

A2. Estimated prevalence (number and proportion) of Americans age 65 and older with Alzheimer's dementia for 2022: The estimated 6.5 million persons ages 65 years and older with Alzheimer's dementia and the estimated numbers of persons with Alzheimer's in each age group were reported from a study that used data from the Chicago Health and Aging Project (CHAP) in combination with population projections from the U.S. Census.[224] The number, 6.5 million, is higher than estimated from previous study that also combined CHAP and U.S. Census data. This is because the more recent study used updated Census projections and incorporated information from Hispanic/Latino American persons. The proportion of the population with Alzheimer's dementia (among all persons age 65 and older and by age group) is calculated using as the numerators the numbers of persons with Alzheimer's dementia, as reported by the recent study in CHAP.[224] The denominators were the U.S. Census population projections for the specific age groups of interest.

A3. Differences between CHAP and ADAMS estimates for Alzheimer's dementia prevalence: The number of people in the U.S. living with Alzheimer's dementia is higher in CHAP than in the Aging, Demographics, and Memory Study (ADAMS).[224,228] This discrepancy is mainly due to two differences in diagnostic criteria: (1) a diagnosis of dementia in ADAMS required impairments in daily functioning and (2) people determined to have vascular dementia in ADAMS were not also counted as having Alzheimer's, even if they exhibited clinical symptoms of Alzheimer's.[227] Because the more stringent threshold for dementia in ADAMS may miss people with mild Alzheimer's dementia and because clinical-pathologic studies have shown that mixed dementia due to both Alzheimer's and vascular pathology in the brain is very common,[32] the Association believes that the larger CHAP estimates may be a more relevant estimate of the burden of Alzheimer's dementia in the United States.

A4. State-by-state prevalence of Alzheimer's dementia: These state-by-state prevalence numbers are based on an analysis of incidence data from CHAP, projected to each state's population for 2020 and 2025, with adjustments for state-specific age, gender, years of education, race and mortality.[259] These projections come from a previous analysis of CHAP data that is not the same as the analysis providing the total number for the United States in 2021. State-by-state projections are not available for 2022.

A5. Criteria for identifying people with Alzheimer's or other dementias in the Framingham Heart Study: From 1975 to 2009, 7,901 people from the Framingham Study who had survived free of dementia to at least age 45, and 5,937 who had survived free of dementia until at least age 65 were followed for incidence of dementia.[263] Diagnosis of dementia was made according to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) criteria and required that the participant survive for at least 6 months after onset of symptoms. Standard diagnostic criteria (the NINCDS-ADRDA criteria from 1984) were used to diagnose Alzheimer's dementia. The definition of Alzheimer's and other dementias used in the Framingham Study was very strict; if a definition that included milder disease and disease of less than six months' duration were used, lifetime risks of Alzheimer's and other dementias would be higher than those estimated by this study.

A6. Projected number of people with Alzheimer's dementia, 2020-2060: This figure comes from the CHAP study.[224] Other projections are somewhat lower (see, for example, Brookmeyer et al.[775]) because they relied on more conservative methods for counting people who currently have Alzheimer's dementia.[A3] Nonetheless, these estimates are statistically consistent with each other, and all projections suggest substantial growth in the number of people with Alzheimer's dementia over the coming decades.

A7. Annual mortality rate due to Alzheimer's disease by state: Unadjusted death rates are presented rather than age-adjusted death rates in order to provide a clearer depiction of the burden of mortality for each state. States such as Florida with larger populations of older people will have a larger burden of mortality due to Alzheimer's — a burden that appears smaller relative to other states when the rates are adjusted for age.

A8. Number of family and other unpaid caregivers of people with Alzheimer's or other dementias: To calculate this number, the Alzheimer's Association started with data from the Behavioral Risk Factor Surveillance System (BRFSS) survey. Between 2015 and 2020, 44 states and the District of Columbia utilized the BRFSS caregiver module. This module identified respondents age 18 and over who had provided any regular care or assistance during the past month to a family member or friend who had a health problem, long-term illness or disability. The module asks a series of follow-up questions, including asking the caregiver to identify what the main health problem, long-term illness, or disability that the person they care for has. One of the reported condition categories is "Alzheimer's disease, dementia, or other cognitive impairment." In the 2019 and 2020 BRFSS, an additional follow-up question was included, asking if the caregiving recipient also had dementia in addition to their main condition. Prior to 2019, the survey did not include caregivers of recipients for whom dementia was not their main condition, so these numbers were imputed using data collected in 2019 by the National Alliance for Caregiving (NAC)/AARP survey. The NAC/AARP survey asked respondents age 18 and over whether they were providing unpaid care for a relative or friend age 18 or older or had provided such care during the past 12 months. Respondents who answered affirmatively were then asked about the health problems of the person for whom they provided care: 11% of respondents reported dementia as the main condition of their care recipient, while 26% of all respondents reported the presence of dementia. Using this ratio in combination with BRFSS data, the Alzheimer's Association was able to determine the percentage of adults in 44 states and the District of Columbia who are caregivers for individuals living with Alzheimer's or another dementia. For the six states without 2015-2020 BRFSS data, this percentage was estimated using state-specific BRFSS data from 2009 combined with the aggregated average of BRFSS data from 2015-2017. To determine the number of Alzheimer's and dementia caregivers in each state, the percentages were applied to the estimated number of people age 18 and older in each state in July 2021, using U.S. Census Bureau data available at: https://www.census.gov/programs-surveys/popest/data/tables.html. This resulted in a total of 11.343 million Alzheimer's and dementia caregivers across all 50 states and the District of Columbia.

A9. The 2014 Alzheimer's Association Women and Alzheimer's Poll: This poll questioned a nationally-representative sample of 3,102 American adults about their attitudes, knowledge and experiences related to Alzheimer's and dementia from Jan. 9, 2014, to Jan. 29, 2014. An additional 512 respondents who provided unpaid help to a relative or friend with Alzheimer's or a related dementia were asked questions about their care provision. Random selections of telephone numbers from landline and cell phone exchanges throughout the United States were conducted. One individual per household was selected from the landline sample, and cell phone respondents were selected if they were 18 years old or older. Interviews were administered in English and Spanish. The poll "oversampled" Hispanics/Latinos, selected from U.S. Census tracts with higher than an 8% concentration of this group. A list sample of Asian Americans was also utilized to oversample this group. A general population weight was used to adjust for number of adults in the household and telephone usage; the second stage of this weight balanced the sample to estimated U.S. population characteristics.

A weight for the caregiver sample accounted for the increased likelihood of female and white respondents in the caregiver sample. Sampling weights were also created to account for the use of two supplemental list samples. The resulting interviews comprise a probability-based, nationally representative sample of U.S. adults. A caregiver was defined as an adult over age 18 who, in the past 12 months, provided unpaid care to a relative or friend age 50 or older with Alzheimer's or another dementia. Questionnaire design and interviewing were conducted by Abt SRBI of New York.

A10. Number of hours of unpaid care: The BRFSS survey asks caregivers to identify, within five time frames, the number of hours they provide care in an average week. Using the method developed by Rabarison and colleagues,[395] the Alzheimer's Association assumed the midpoint of each time frame was the average number of hours for each caregiver within that time frame and then calculated the overall average number of hours of weekly care provided by dementia caregivers in each state. This number was then converted to a yearly average and multiplied by the number of caregivers in each state[A8] to determine the total number of hours of care provided. For the 6 states without recent BRFSS data, their number of hours was calculated using the aggregated average of BRFSS data from 2015-2017. When added together, across all 50 states and the District of Columbia, the total number of hours provided by Alzheimer's and dementia caregivers is 16.023 billion hours.

A11. Value of unpaid caregiving: For each state, the hourly value of care was determined as the average of the state minimum hourly wage[776] and the most recently available state median hourly cost of a home health aide. (For Nevada, the minimum wage used was the average of the minimum wage for those who are not provided health insurance and the minimum wage for those who are provided health insurance.)[686] The average for each state was then multiplied by the total number of hours of unpaid care in that state[A10] to derive the total value of unpaid care. Adding the totals from all states and the District of Columbia resulted in an economic value of $271.598 billion for dementia caregiving in the United States in 2021.

A12. Lewin Model on Alzheimer's and dementia costs: These numbers come from a model created for the Alzheimer's Association by the Lewin Group. The model estimates total payments for health care, long-term care and hospice — as well as state-by-state Medicaid spending — for people with Alzheimer's and other dementias. The model was updated by the Lewin Group in January 2015 (updating previous model) and June 2015 (addition of state-by-state Medicaid estimates). Detailed information on the model, its long-term projections and its methodology are available at: alz.org/trajectory. For the purposes of the data presented in this report, the following parameters of the model were changed relative to the methodology outlined at alz.org/trajectory: (1) cost data from the 2018 Medicare Current Beneficiary Survey (MCBS) were used rather than data from the 2008 MCBS; (2) prevalence among older adults was assumed to equal the prevalence levels from Rajan and colleagues[224] and included in this report (6.5 million in 2022), rather than the prevalence estimates derived by the model itself; (3) estimates of inflation and excess cost growth reflect the most recent relevant estimates from the cited sources (Centers for Medicare & Medicaid Services [CMS] actuaries and the Congressional Budget Office); and (4) the most recent (2014) state-by-state data from CMS on the number of nursing home residents and percentage with moderate and severe cognitive impairment were used in lieu of 2012 data. Because state-specific prevalence estimates do not exist for 2022, the state-specific Medicaid costs included in *Facts and Figures* are based on the 2020 prevalence estimates reported here.[A4]

A13. All cost estimates were inflated to year 2021 dollars using the Consumer Price Index (CPI): All cost estimates were inflated using the seasonally adjusted average prices for medical care services from all urban consumers. The relevant item within medical care services was used for each cost element. For example, the medical care item within the CPI was used to inflate total health care payments; the hospital services item within the CPI was used to inflate hospital payments; and the nursing home and adult day services item within the CPI was used to inflate nursing home payments.

A14. Average annual per-person payments for health care and long-term care services for Medicare beneficiaries age 65 and older with and without Alzheimer's or other dementias: Payments are unadjusted, and therefore, do not account for differences in patient characteristics, such as age or sex.

A15. Medicare Current Beneficiary Survey Report: These data come from an analysis of findings from the 2018 Medicare Current Beneficiary Survey (MCBS). The analysis was conducted for the Alzheimer's Association by Health Care Cost Institute.[260] The MCBS, a continuous survey of a nationally representative sample of about 15,000 Medicare beneficiaries, is linked to Medicare claims. The survey is supported by the U.S. Centers for Medicare & Medicaid Services (CMS). For community-dwelling survey participants, MCBS interviews are conducted in person three times a year with the Medicare beneficiary or a proxy respondent if the beneficiary is not able to respond. For survey participants who are living in a nursing home or another residential care setting, such as an assisted living residence, retirement home or a long-term care unit in a hospital or mental health facility, MCBS interviews are conducted with a staff member designated by the facility administrator as the most appropriate to answer the questions. Data from the MCBS analysis that are included in *2022 Alzheimer's Disease Facts and Figures* pertain only to Medicare beneficiaries age 65 and older. For this MCBS analysis, people with dementia are defined as:

- Community-dwelling survey participants who answered yes to the MCBS question, "Has a doctor ever told you that you had Alzheimer's disease or dementia?" Proxy responses to this question were accepted.
- Survey participants who were living in a nursing home or other residential care setting and had a diagnosis of Alzheimer's disease or dementia in their medical record
- Survey participants who had at least one Medicare claim with a diagnostic code for Alzheimer's or other dementias in 2008. The claim could be for any Medicare service, including hospital, skilled nursing facility, outpatient medical care, home health care, hospice or physician, or other health care provider visit. The diagnostic codes used to identify survey participants with Alzheimer's or other dementias are 331.0, 331.1, 331.11, 331.19, 331.2, 331.7, 331.82, 290.0, 290.1, 290.10, 290.11, 290.12, 290.13, 290.20, 290.21, 290.3, 290.40, 290.41, 290.42, 290.43, 291.2, 294.0, 294.1, 294.10 and 294.11.

Costs from the MCBS analysis are based on responses from 2018 and reported in 2021 dollars.

A16. Differences in Estimated costs reported by Hurd and colleagues: Hurd and colleagues[644] estimated per-person costs using data from participants in ADAMS, a cohort in which all individuals underwent diagnostic assessments for dementia. *2022 Alzheimer's Disease Facts and Figures* estimated per-person costs using data from the Medicare Current Beneficiary Survey (MCBS) to be $52,481. One reason that the per-person costs estimated by Hurd and colleagues are lower than those reported in *Facts and Figures* is that ADAMS, with its diagnostic evaluations of everyone in the study, is more likely than MCBS to have identified individuals with less severe or undiagnosed Alzheimer's. By contrast, the individuals with Alzheimer's registered by MCBS are likely to be those with more severe, and therefore more costly, illness. A second reason is that the Hurd et al. Estimated costs reflect an effort to isolate the incremental costs associated with Alzheimer's and other dementias (those costs attributed only to dementia), while the per-person costs in *2021 Alzheimer's Disease Facts and Figures* incorporate all costs of caring for people with the disease (regardless of whether the expenditure was related to dementia or a coexisting condition).

References

1. Quiroz YT, Zetterberg H, Reiman EM, Chen Y, Su Y, Fox-Fuller JT, et al. Plasma neurofilament light chain in the presenilin 1 E280A autosomal dominant Alzheimer's disease kindred: A cross-sectional and longitudinal cohort study. Lancet Neuro 2020;19(6):513-21.
2. Barthelemy N, Joseph-Mathurin N, Gordon BA, Hassenstab, Benzinger TLS, et al. A soluble phosphorylated tau signature links tau, amyloid and the evolution of stages of dominantly inherited Alzheimer's disease. Nat Med 2020;26:398-407.
3. Villemagne VL, Burnham S, Bourgeat P, Brown B, Ellis KA, Salvado O, et al. Amyloid ß deposition, neurodegeneration, and cognitive decline in sporadic Alzheimer's disease: A prospective cohort study. Lancet Neurol 2013;12(4):357-67.
4. Reiman EM, Quiroz YT, Fleisher AS, Chen K, Velez-Pardos C, Jimenez-Del-Rio M, et al. Brain imaging and fluid biomarker analysis in young adults at genetic risk for autosomal dominant Alzheimer's disease in the presenilin 1 E280A kindred: A case-control study. Lancet Neurol 2012;11(2):1048-56.
5. Jack CR, Lowe VJ, Weigand SD, Wiste HJ, Senjem ML, Knopman DS, et al. Serial PiB and MRI in normal, mild cognitive impairment and Alzheimer's disease: Implications for sequence of pathological events in Alzheimer's disease. Brain 2009;132:1355-65.
6. Bateman RJ, Xiong C, Benzinger TL, Fagan AM, Goate A, Fox NC, et al. Clinical and biomarker changes in dominantly inherited Alzheimer's disease. N Engl J Med 2012;367(9):795-804.
7. Gordon BA, Blazey TM, Su Y, Hari-Raj A, Dincer A, Flores S, et al. Spatial patterns of neuroimaging biomarker change in individuals from families with autosomal dominant Alzheimer's disease: A longitudinal study. Lancet Neurol 2018;17(3):241-50.
8. Braak H, Thal DR, Ghebremedhin E, Del Tredici K. Stages of the pathologic process in Alzheimer disease: Age categories from 1 to 100 years. J Neuropathol Exp Neurol 2011;70(11):960-9.
9. Byard RW, Langlois NEI. Wandering dementia: A syndrome with forensic implications. J Forensic Sci 2019;64(2):443-5.
10. Tom SE, Hubbard RA, Crane PK, Haneuse SJ, Bowen J, McCormick WC, et al. Characterization of dementia and Alzheimer's disease in an older population: Updated incidence and life expectancy with and without dementia. Am J Public Health 2015;105(2):408-13.
11. Ganguli M, Dodge HH, Shen C, Pandav RS, DeKosky ST. Alzheimer disease and mortality: A 15-year epidemiological study. Arch Neurol 2005;62(5):779-84.
12. Waring SC, Doody RS, Pavlik VN, Massman PJ, Chan W. Survival among patients with dementia from a large multi-ethnic population. Alzheimer Dis Assoc Disord 2005;19(4):178-83.
13. Brookmeyer R, Corrada MM, Curriero FC, Kawas C. Survival following a diagnosis of Alzheimer disease. Arch Neurol 2002;59(11):1764-7.
14. Larson EB, Shadlen MF, Wang L, McCormick WC, Bowen JD, Teri L, et al. Survival after initial diagnosis of Alzheimer disease. Ann Intern Med 2004;140(7):501-9.
15. Helzner EP, Scarmeas N, Cosentino S, Tang MX, Schupf N, Stern Y. Survival in Alzheimer disease: A multiethnic, population-based study of incident cases. Neurology 2008;71(19):1489-95.
16. Xie J, Brayne C, Matthews FE. Survival times in people with dementia: Analysis from a population based cohort study with 14-year follow-up. BMJ 2008;336(7638):258-62.
17. Brodaty H, Seeher K, Gibson L. Dementia time to death: A systematic literature review on survival time and years of life lost in people with dementia. Int Psychogeriatr 2012;24(7):1034-45.
18. Todd S, Barr S, Roberts M, Passmore AP. Survival in dementia and predictors of mortality: A review. Int J Geriatr Psychiatry 2013;28(11):1109-24.
19. Sato C, Barthélemy NR, Mawuenyega KG, Patterson BW, Gordon BA, Jockel-Balsarotti J, et al. Tau kinetics in neurons and the human central nervous system. Neuron 2018;98(4):861-4.
20. Hanseeuw, BJ, Betensky RA, Jacobs HIL, Schultz AP, Sepulcre J, Becker JA, et al. Association of amyloid and tau with cognition in preclinical Alzheimer disease. JAMA Neurol 2019;76(8):915-24.
21. Kapasi A, DeCarli C, Schneider JA. Impact of multiple pathologies on the threshold for clinically overt dementia. Acta Neuropathol 2017;134(2):171-86.
22. Brenowitz WD, Hubbard RA, Keene CD, Hawes SE, Longstreth WT, Woltjer, et al. Mixed neuropathologies and estimated rates of clinical progression in a large autopsy sample. Alzheimers Dement. 2017;13(6):654-62.
23. National Institute on Aging. What are frontotemporal disorders? Available at: https://www.nia.nih.gov/health/what-are-frontotemporal-disorders. Accessed December 18, 2021.
24. Hogan DB, Jette N, Fiest KM, Roberts JI, Pearson D, Smith EE, et al. The prevalence and incidence of frontotemporal dementia: A systematic review. Can J Neurol Sci 2016;43(suppl):S96-109.
25. Stojkovska I, Krainc D, Mazzulli JR. Molecular mechanisms of α-synuclein and GBA1 in Parkinson's disease. Cell Tissue Res 2018;373(1):51-60.
26. De Reuck J, Maurage CA, Deramecourt V, Pasquier F, Cordonnier C, Leys D, et al. Aging and cerebrovascular lesions in pure and in mixed neurodegenerative and vascular dementia brains: A neuropathological study. Folia Neuropathol 2018;56(2):81-7.
27. James BD, Bennett DA, Boyle PA, Leurgans S, Schneider JA. Dementia from Alzheimer disease and mixed pathologies in the oldest old. JAMA 2012;307(17):1798-1800.
28. Kawas CH, Kim RC, Sonnen JA, Bullain SS, Trieu T, Corrada MM. Multiple pathologies are common and related to dementia in the oldest-old: The 90+ Study. Neurology 2015;85(6):535-42.
29. Viswanathan A, Rocca WA, Tzourio C. Vascular risk factors and dementia: How to move forward? Neurology 2009;72:368-74.
30. Schneider JA, Arvanitakis Z, Bang W, Bennett DA. Mixed brain pathologies account for most dementia cases in community-dwelling older persons. Neurology 2007;69:2197-204.
31. Schneider JA, Arvanitakis Z, Leurgans SE, Bennett DA. The neuropathology of probable Alzheimer disease and mild cognitive impairment. Ann Neurol 2009;66(2):200-8.
32. Jellinger KA, Attems J. Neuropathological evaluation of mixed dementia. J Neurol Sci 2007;257(1-2):80-7.
33. Jellinger KA. The enigma of mixed dementia. Alzheimers Dement 2007;3(1):40-53.
34. Boyle PA, Yu L, Leurgans SE, Wilson RS, Brookmeyer R, Schneider JA, et al. Attributable risk of Alzheimer's dementia attributed to age-related neuropathologies. Ann Neurol 2019;85(1):114-24.
35. Boyle PA, Lei Y, Wilson RS, Leurgans SE, Schneider JA, Bennett DA. Person-specific contribution of neuropathologies to cognitive loss in old age. Ann Neurol 2018;83(1):74-83.
36. Jellinger KA, Attems J. Prevalence of dementia disorders in the oldest-old: an autopsy study. Acta Neuropathol 2010;119:421-33.
37. Sperling RA, Aisen PS, Beckett LA, Bennett DA, Craft S, Fagan AM, et al. Toward defining the preclinical stages of Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):280-92.
38. Albert MS, DeKosky ST, Dickson D, Dubois B, Feldman HH, Fox N, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):270-9.
39. McKhann GM, Knopman DS, Chertkow H, Hyman BT, Jack CR, Kawas CH, et al. The diagnosis of dementia due to Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):263-9.
40. Jack CR, Albert MS, Knopman DS, McKhann GM, Sperling RA, Carrillo MC, et al. Introduction to the recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement 2011;7(3):257-62.

41. Vermunt L, Sikkes SAM, van den Hout A, Handels R, Bos I, van der Flier WM, et al. Duration of preclinical, prodromal, and dementia stages of Alzheimer's disease in relation to age, sex, and APOE genotype. Alzheimers Dement 2019;15:888-98.
42. Sperling RA, Donohue MC, Raman R, Sun C-K, Yaari R, Holdridge K, et al. Association of factors with elevated amyloid burden in clinically normal older individuals. JAMA Neurol 2020;77(6):735-45.
43. Olsson B, Lautner R, Andreasson U, Ohrfelt A, Portelius E, Bjerke M et al. CSF and blood biomarkers for the diagnosis of Alzheimer's disease: A systematic review and meta-analysis. Lancet Neurol 2016;15(7):673-84.
44. Hunt A, Schonknecht P, Henze M, Seidl U, Haberkorn U, Schroder J. Reduced cerebral glucose metabolism in patients at risk for Alzheimer's disease. Psych Res: Neuroimaging 2007;155:147-54.
45. Bennett DA, Schneider JA, Arvanitakis Z, Kelly JF, Aggarwal NT, Shah RC, et al. Neuropathology of older persons without cognitive impairment from two community-based studies. Neurology 2006;66:1837-44.
46. Knopman DS, Parisi JE, Salviati A, Floriach-Robert M, Boeve BF, Ivnik RJ, et al. Neuropathology of cognitively normal elderly. J Neuropathol Exp Neurol 2003;62:1087-95.
47. Grøntvedt GR, Schröder TN, Sando SB, White L, Bråthen G, Doeller CF. Alzheimer's disease. Curr Bio 2018;28:PR645-9.
48. Petersen RC, Lopez O, Armstrong MJ, Getchius TSD, Ganguli M, Gloss D, et al. Practice guideline update summary: Mild cognitive impairment. Neurology 2018;90(3):126-35.
49. Ward A, Tardiff S, Dye C, Arrighi HM. Rate of conversion from prodromal Alzheimer's disease to Alzheimer's dementia: A systematic review of the literature. Dement Geriatr Cogn Disord Extra 2013;3(1):320-32.
50. Cummings J, Aisen P, Apostolova LG, Atri A, Salloway S, Weiner M. Aducanumab: Appropriate use recommendations. J Prev Alz Dis 2021;4(8):398-410.
51. Sperling RA, Jack CR, Black SE, Frosch MP, Greenerg SM, Hyman BT, et al.Amyloid-related imaging abnormalities in amyloid-modifying therapeutic trials: Recommendations from the Alzheimer's Association Research Roundtable Workgroup. Alzheimers Dement 2011;7(4):367-85.
52. Aducanumab (marketed as Aduhelm) Information. Available at: https://www.fda.gov/drugs/postmarket-drug-safety-information-patients-and-providers/aducanumab-marketed-aduhelm-information. Accessed December 10, 2021.
53. Watt JA, Goodarzi Z, Veroniki AA, Nincic V, Khan PA, Ghassemi M, et al. Comparative efficacy of interventions for aggressive and agitated behaviors in dementia. Ann Internal Med 2019;171(9):633-42.
54. Ralph SJ, Espinet AJ. Increased all-cause mortality by antipsychotic drugs: Updated review and meta-analysis in dementia and general mental health care. J Alzheimers Dis Rep 2018;2:1-26.
55. Maust DT, Kim HM, Seyfried LS, Chiang C, Kavanagh J, Schneider LS, et al. Antipsychotics, other psychotropics, and the risk of death in patients with dementia: number needed to harm. JAMA Psychiatry 2015;72:438-45.
56. Livingston G, Huntley J, Sommerlad A, Ames D, Ballard C, Banerjee S, et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. Lancet 2020;396(10248):413-46.
57. Vickrey BG, Mittman BS, Connor KI, Pearson ML, Della Penna RD, Ganiats TG, et al. The effect of a disease management intervention on quality and outcomes of dementia care: A randomized, controlled trial. Ann Intern Med 2006;145(10):713-26.
58. Voisin T, Vellas B. Diagnosis and treatment of patients with severe Alzheimer's disease. Drugs Aging 2009;26(2):135-44.
59. Grossberg GT, Christensen DD, Griffith PA, Kerwin DR, Hunt G, Hall EJ. The art of sharing the diagnosis and management of Alzheimer's disease with patients and caregivers: Recommendations of an expert consensus panel. Prim Care Companion J Clin Psychiatry 2010;12(1):PCC.09cs00833.
60. Hebert LE, Bienias JL, Aggarwal NT, Wilson RS, Bennett DA, Shah RC, et al. Change in risk of Alzheimer disease over time. Neurology 2010;75:786-91.
61. National Institute on Aging. What causes Alzheimer's disease. Available at: https://www.nia.nih.gov/health/what-causes-alzheimers-disease. Accessed December 18, 2021.
62. Saunders AM, Strittmatter WJ, Schmechel D, George-Hyslop PH, Pericak-Vance MA, Joo SH, et al. Association of apolipoprotein E allele epsilon 4 with late-onset familial and sporadic Alzheimer's disease. Neurology 1993;43:1467-72.
63. Farrer LA, Cupples LA, Haines JL, Hyman B, Kukull WA, Mayeux R, et al. Effects of age, sex, and ethnicity on the association between apolipoprotein E genotype and Alzheimer disease: A meta-analysis. JAMA 1997;278:1349-56.
64. Green RC, Cupples LA, Go R, Benke KS, Edeki T, Griffith PA, et al. Risk of dementia among white and African American relatives of patients with Alzheimer disease. JAMA 2002;287(3):329-36.
65. Fratiglioni L, Ahlbom A, Viitanen M, Winblad B. Risk factors for late-onset Alzheimer's disease: A population-based, case-control study. Ann Neurol 1993;33(3):258-66.
66. Mayeux R, Sano M, Chen J, Tatemichi T, Stern Y. Risk of dementia in first-degree relatives of patients with Alzheimer's disease and related disorders. Arch Neurol 1991;48(3):269-73.
67. Lautenschlager NT, Cupples LA, Rao VS, Auerbach SA, Becker R, Burke J, et al. Risk of dementia among relatives of Alzheimer's disease patients in the MIRAGE Study: What is in store for the oldest old? Neurology 1996;46(3):641-50.
68. Hebert LE, Weuve J, Scherr PA, Evans DA. Alzheimer disease in the United States (2010-2050) estimated using the 2010 Census. Neurology 2013;80(19):1778-83.
69. Nelson PT, Head E, Schmitt FA, Davis PR, Neltner JH, Jicha GA, et al. Alzheimer's disease is not "brain aging": Neuropathological, genetic, and epidemiological human studies. Acta Neuropathol 2011;121:571-87.
70. Loy CT, Schofield PR, Turner AM, Kwok JBJ. Genetics of dementia. Lancet 2014;383:828-40.
71. Holtzman DM, Herz J, Bu G. Apolipoprotein E and apolipoprotein E receptors: Normal biology and roles in Alzheimer disease. Cold Spring Harb Perspect Med 2012;2(3):a006312.
72. Michaelson DM. APOE Ɛ4: The most prevalent yet understudied risk factor for Alzheimer's disease. Alzheimers Dement 2014;10:861-8.
73. Jansen WJ, Ossenkoppele R, Knol KL, Tijms BM, Scheltens P, Verhey FRJ, et al. Prevalence of cerebral amyloid pathology in persons without dementia JAMA 2015;313(19):1924-38.
74. Spinney L. Alzheimer's disease: The forgetting gene. Nature 2014;510(7503):26-8.
75. Ward A, Crean S, Mercaldi CJ, Collins JM, Boyd D, Cook MN, et al. Prevalence of apolipoprotein e4 genotype and homozygotes (APOE e4/4) among patients diagnosed with Alzheimer's disease: A systematic review and meta-analysis. Neuroepidemiology 2012;38:1-17.
76. Mayeux R, Saunders AM, Shea S, Mirra S, Evans D, Roses AD, et al. Utility of the apolipoprotein E genotype in the diagnosis of Alzheimer's disease. N Engl J Med 1998;338:506-11.
77. Evans DA, Bennett DA, Wilson RS, Bienias JL, Morris MC, Scherr PA, et al. Incidence of Alzheimer disease in a biracial urban community: Relation to apolipoprotein E allele status. Arch Neurol 2003;60(2):185-9.
78. Tang M, Stern Y, Marder K, Bell K, Gurland B, Lantigua R, et al. The APOE-e4 allele and the risk of Alzheimer disease among African Americans, whites, and Hispanics. JAMA 1998;279: 751-55.
79. Weuve J, Barnes LL, Mendes de Leon CF, Rajan KB, Beck T, Aggarwal NT, et al. Cognitive aging in black and white Americans: Cognition, cognitive decline, and incidence of Alzheimer disease dementia. Epidemiology 2018;29(1):151-9.
80. Hendrie HC, Murrell J, Baiyewu O, Lane KA, Purnell C, Ogunniyi A, et al. APOE Ɛ4 and the risk for Alzheimer disease and cognitive decline in African Americans and Yoruba. Int Psychogeriatr 2014;26(6):977-85.

81. Reitz C, Jun G, Naj A, Rajbhandary R, Vardarajan BN, Wang LS, et al. Variants in the ATP-binding cassette transporter (ABCA7), apolipoprotein E epsilon 4, and the risk of late-onset Alzheimer disease in African Americans. JAMA 2013;309(14):1483-92.
82. Gottesman RF, Albert MS, Alonso A, Coker LH, Coresh J, Davis SM, et al. Associations between midlife vascular risk factors and 25-year incident dementia in the Atherosclerosis Risk in Communities (ARIC) cohort. JAMA Neurol 2017;74(10): 1246-54.
83. Bakulski KM, Vadari HS, Faul JD, Heeringa SG, Kardia SLR, Langa KM, et al. Cumulative genetic risk and APOE e4 are independently associated with dementia status in a multiethnic, population-based cohort. Neurol Genet 2021;7:e576.
84. Rajan KB, Barnes LL, Wilson RS, McAninch EA, Weuve J, Sighoko D, et al. Racial differences in the association between apolipoprotein E risk alleles and overall and total cardiovascular mortality over 18 years. JAGS 2017;65:2425-30.
85. Granot-Hershkovitz E, Tarraf W, Kurniansyah N, Daviglus M, Isasi CR, Kaplan R, et al. APOE alleles' association with cognitive function differs across Hispanic/Latino groups and genetic ancestry in the study of Latinos-investigation of neurocognitive aging (HCHS/SOL). Alzheimer's Dement 2021;17:466-74.
86. Lott IT, Dierssen M. Cognitive deficits and associated neurological complications in individuals with Down's syndrome. Lancet Neurol 2010;9(6):623-33.
87. National Down Syndrome Society. Alzheimer's Disease and Down Syndrome. Available at: https://www.ndss.org/resources/alzheimers/. Accessed December 18, 2021.
88. Fortea J, Vilaplana E, Carmona-Iragui M, Benejam B, Videla L, Barroeta I, et al. Clinical and biomarker changes of Alzheimer's disease in adults with Down syndrome: A cross-sectional study. Lancet 2020;395(10242):1988-97.
89. Fortea J, Zaman SH, Hartley S, Rafii MS, Head E, Carmona-Iragui M. Alzheimer's disease associated with Down syndrome: A genetic form of dementia. Lancet Neurol 2021;20(11):930-42.
90. Hithersay R, Startin CM, Hamburg S, Mok KY, Hardy J, Fisher EMC, et al.Association of dementia with mortality among adults with Down syndrome older than 35 years. JAMA Neurol 2019;76(2):152-60.
91. Bekris LM, Yu CE, Bird TD, Tsuang DW. Genetics of Alzheimer disease. J Geriatr Psychiatry Neurol 2010;23(4):213-27.
92. Goldman JS, Hahn SE, Bird T. Genetic counseling and testing for Alzheimer disease: Joint practice guidelines of the American College of Medical Genetics and the National Society of Genetic Counselors. Genet Med 2011;13:597-605.
93. Wolters FJ, van der Lee SJ, Koudstaal PJ, van Duijn CM, Hofman A, Ikam MK, et al. Parental family history of dementia in relation to subclinical brain disease and dementia risk. Neurology 2017;88:1642-9.
94. World Health Organization. Risk reduction of cognitive decline and dementia: WHO guidelines. https://www.who.int/publications/i/item/risk-reduction-of-cognitive-decline-and-dementia. Accessed December 18, 2021.
95. Baumgart M, Snyder HM, Carrillo MC, Fazio S, Kim H, Johns H. Summary of the evidence on modifiable risk factors for cognitive decline and dementia: A population-based perspective. Alzheimers Dement 2015;11(6):718-26.
96. Institute of Medicine. Cognitive Aging: Progress in Understanding and Opportunity for Action. Washington, D.C.: The National Academies Press; 2015.
97. Mergenthaler P, Lindauer U, GA Dienel, Meisel A. Sugar for the brain: The role of glucose in physiological and pathological brain function. Trends Neurosci 2013;36(10):587-97.
98. Samieri C, Perier MC, Gaye B, Proust-Lima C Helmer C, Dartigues JF, et al. Association of cardiovascular health level in older age with cognitive decline and incident dementia. JAMA 2018;320(7):657-64.
99. Anstey KJ, von Sanden C, Salim A, O'Kearney R. Smoking as a risk factor for dementia and cognitive decline: A meta-analysis of prospective studies. Am J Epidemiol 2007;166(4):367-78.
100. Rusanen M, Kivipelto M, Quesenberry CP, Zhou J, Whitmer RA. Heavy smoking in midlife and long-term risk of Alzheimer disease and vascular dementia. Arch Intern Med 2011;171(4):333-9.
101. Beydoun MA, Beydoun HA, Gamaldo AA, Teel A, Zonderman AB, Wang Y. Epidemiologic studies of modifiable factors associated with cognition and dementia: Systematic review and meta-analysis. BMC Public Health 2014;14:643.
102. Ohara T, Ninomiya T, Hata J, Ozawa M, Yoshida D, Mukai N, et al. Midlife and late-life smoking and risk of dementia in the community: The Hisayama Study. J Am Geriatr Soc 2015;63(11):2332-9.
103. Choi D, Choi S, Park SM. Effect of smoking cessation on the risk of dementia: A longitudinal study. Ann Clin Transl Neurol 2018;5(10):1192-9.
104. Lewis CR, Talboom JS, De Both MD, Schmidt AM Naymik MA, Haberg AK, et al. Smoking is associated with impaired verbal learning and memory performance in women more than men. Sci Rep 2021;11:10248.
105. Wu W, Brickman AM, Luchsinger J, Ferrazzano P, Pichiule P, Yoshita M, et al. The brain in the age of old: The hippocampal formation is targeted differentially by diseases of late life. Ann Neurol 2008;64:698-706.
106. Gudala K, Bansal D, Schifano F, Bhansali A. Diabetes mellitus and risk of dementia: A meta-analysis of prospective observational studies. Diabetes Investig 2013;4(6):640-50.
107. Vagelatos NT, Eslick GD. Type 2 diabetes as a risk factor for Alzheimer's disease: The confounders, interactions, and neuropathology associated with this relationship. Epidemiol Rev 2013;35(1):152-60.
108. Reitz C, Brayne C, Mayeux R. Epidemiology of Alzheimer disease. Nat Rev Neurol 2011;7(3):137-52.
109. Biessels GJ, Despa F. Cognitive decline and dementia in diabetes mellitus: mechanisms and clinical implications. Nat Rev Endocrinol 2018;14(10):591-604.
110. Arnold SE, Arvanitakis Z, Macauley-Rambach SL, Koenig AM, Wang HY, Ahima RS, et al. Brain insulin resistance in type 2 diabetes and Alzheimer disease: Concepts and conundrums. Nat Rev Neurol. 2018;14(3):168-81.
111. Rönnemaa E, Zethelius B, Lannfelt L, Kilander L. Vascular risk factors and dementia: 40-year follow-up of a population-based cohort. Dement Geriatr Cogn Disord 2011;31(6):460-6.
112. Kivimaki M, Luukkonen R, Batty GD, Ferrie JE, Pentti J, Nyberg ST, et al. Body mass index and risk of dementia: Analysis of individual-level data from 1.3 million individuals. Alzheimers Dement 2018;14:601-9.
113. Loef M, Walach H. Midlife obesity and dementia: Meta-analysis and adjusted forecast of dementia prevalence in the United States and China. Obesity (Silver Spring) 2013;21(1):E51-5.
114. Anstey KJ, Cherbuin N, Budge M, Young J. Body mass index in midlife and late-life as a risk factor for dementia: A meta-analysis of prospective studies. Obes Rev 2011;12(5):E426-37.
115. Gottesman RF, Schneider AL, Zhou Y, Coresh J, Green E, Gupta N, et al. Association between midlife vascular risk factors and estimated brain amyloid deposition. JAMA 2017;17(14): 1443-50.
116. Abell JG, Kivimäki M, Dugravot A, Tabak AG, Fayosse A, Shipley M, et al. Association between systolic blood pressure and dementia in the Whitehall II cohort study: Role of age, duration, and threshold used to define hypertension. Eur Heart J 2018;39(33):3119-25.
117. Ninomiya T, Ohara T, Hirakawa Y, Yoshida D, Doi Y, Hata J, et al. Midlife and late-life blood pressure and dementia in Japanese elderly: The Hisayama Study. Hypertension 2011;58(1):22-8.
118. Debette S, Seshadri S, Beiser A, Au R, Himali JJ, Palumbo C, et al. Midlife vascular risk factor exposure accelerates structural brain aging and cognitive decline. Neurology 2011;77:461-8.
119. Livingston G, Sommerlad A, Orgeta V, Costafreda SG, Huntley H, Ames D, et al. Dementia prevention, intervention, and care. Lancet 2017;390:2673-734.

120. Anstey KJ, Ashby-Mitchell K, Peters R. Updating the evidence on the association between serum cholesterol and risk of late-life dementia: Review and meta-analysis. J Alzheimers Dis 2017;56(1):215-28.
121. Fitzpatrick A, Kuller LH, Lopez OL Diehr P, O'Meara ES, Longstreth WT, et al. Mid- and late-life obesity: Risk of dementia in the Cardiovascular Health Cognition Study. Arch Neurol 2009;66:336-42.
122. Corrada MM, Hayden KM, Paganini-Hill A, Bullain SS, DeMoss J, Aguirre C, et al. Age of onset of hypertension and risk of dementia in the oldest-old: The 90+ Study. Alzheimer Dement 2017;(13):103-10.
123. Ogino E, Manly JJ, Schupf N, Mayeux R, Gu Y. Current and past leisure time physical activity in relation to risk of Alzheimer's disease in older adults. Alzheimers Dement 2019;15(12):1603-11.
124. Najar J, Ostling S, Gudmundsson P, Sundh V, Johansson L, Kern S, et al. Cognitive and physical activity and dementia: A 44-year longitudinal population study of women. Neurology 2019;92(12):e1322-e1330.
125. Buchman AS, Yu L, Wilson RS, Lim A, Dawe RJ, Gaiteri C, et al. Physical activity, common brain pathologies, and cognition in community-dwelling older adults. Neurology 2019;92(8):e811-e822.
126. Harrington M, Weuve J, Jackson JW, Blacker D. Physical Activity. The AlzRisk Database. Alzheimer Research Forum. Available at: http://www.alzrisk.org. Accessed December 18, 2021.
127. Tan ZS, Spartano NL, Beiser AS, DeCarli C, Auerbach SH, Vasan RS, et al. Physical activity, brain volume, and dementia risk: The Framingham Study. J Gerontol A Biol Sci Med Sci 2017;72: 789-95.
128. Willey JZ, Gardener H, Caunca MR, Moon YP, Dong C, Cheung YK, et al. Leisure-time physical activity associates with cognitive decline: The Northern Manhattan Study. Neurology 2016;86(20):1897-903.
129. Stephen R, Hongistro K, Solomon A, Lonnroos E. Physical activity and Alzheimer's disease: A systematic review. J Gerontol A Biol Sci Med Sci 2017;72(6):733-9.
130. Blondell SJ, Hammersley-Mather R, Veerman JL. Does physical activity prevent cognitive decline and dementia? A systematic review and meta-analysis of longitudinal studies. BMC Public Health 2014;14:510.
131. Koscak TB. Physical activity improves cognition: Possible explanations. Biogerontology 2017;18(4):477-83.
132. Guure CB, Ibrahim NA, Adam MB, Said SM. Impact of physical activity on cognitive decline, dementia, and its subtypes: Meta-analysis of prospective studies. Biomed Res Int 2017;2017:9016924.
133. Soni M, Orrell M, Bandelow S, Steptoe A, Rafnsson S, d'Orsi E, et al. Physical activity pre- and post-dementia: English Longitudinal Study of Ageing. Aging Ment Health 2017;17:1-7.
134. Thomas BP, Tarumi T, Sheng M, Tseng B, Womack KB, Cullum CM, et al. Brain perfusion change in patients with mild cognitive impairment after 12 months of aerobic exercise training. J Alzheimers Dis 2020;75(2):617.
135. Jensen CS, Simonsen AH, Siersma V, Beyer N, Frederiksen KS, Gottrup H, et al. Patients with Alzheier's disease who carry the APOE e4 allele benefit more from physical exercise. TRCI 2019;5:99-106.
136. Barberger-Gateau P, Raffaitin C, Letenneur L, Berr C, Tzourio C, Dartigues JF, et al. Dietary patterns and risk of dementia: The Three-City Cohort Study. Neurology 2007;69(20): 1921-30.
137. Hardman RJ, Kennedy G, Macpherson H, Scholey AB, Pipingas A. Adherence to a Mediterranean-style diet and effects on cognition in adults: A qualitative evaluation and systematic review of longitudinal and prospective trials. Front Nutr 2016;3:22.
138. Lourida I, Soni M, Thompson-Coon J, Purandare N, Lang IA, Ukoumunne OC, et al. Mediterranean diet, cognitive function, and dementia: A systematic review. Epidemiology 2013;24:479-89.
139. Morris MC, Tangney CC, Wang Y, Sacks FM, Barnes LL, Bennett DA, et al. MIND diet slows cognitive decline with aging. Alzheimers Dement 2015;11(9):1015-22.
140. Morris MC, Tangney CC, Wang Y, Sacks FM, Bennett DA, Aggarwal NT. MIND diet associated with reduced incidence of Alzheimer's disease. Alzheimers Dement 2015;11:1007-14.
141. Van den Brink AC, Brouwer-Broisma EM, Berendsen AAM van de Rest O. The Mediterranean, Dietary Approaches to Stop Hypertension (DASH), and Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) Diets are associated with less cognitive decline and a lower risk of Alzheimer's disease: A review. Adv Nutr 2019;10:1040-65.
142. Ballarini T, Melo van Lent D, Brunner J, Schroder A, Wolfsgruber S, Altenstein S, et al. Mediterranean diet, Alzheimer disease biomarkers and brain atrophy in old age. Neurology 2021;96(24):e2920-e2932.
143. Hosking DE, Eramudugolla R, Cherbuin N, Anstey KJ. MIND not Mediterranean diet related to 12-year incidence of cognitive impairment in an Australian longitudinal cohort study. Alzheimers Dement 2019;15:581-9.
144. Martinez-Gonzalez MA, Gea A, Ruiz-Canela M. The Mediterranean diet and cardiovascular health: A critical review: Circulation Res 2019;124:779-98.
145. Sanches Machado d'Almeida K, Spillere SR, Zuchinali P, Souza GC. Mediterranean diet and other dietary patterns in primary prevention of heart failure and changes in cardiac function markers: A systematic review. Nutrients 2018;10:58.
146. Walker ME, O'Donnell AA, Himali JJ, Rajendran I, van Lent DM, Ataklte F, et al. Associations of the Mediterranean-dietary approaches to stop hypertension intervention for neurodegenerative delay diet with cardiac remodelling in the community: The Framingham Heart Study. Br J Nutr 2021;126(12):1888-96.
147. Butler M, Nelson VA, Davila H, Ratner E, Fink HA Hemmy LS, et al. Over-the-counter supplement interventions to prevent cognitive decline, mild cognitive impairment, and clinical Alzheimer-type dementia. Ann Intern Med 2018;168:52-62.
148. Van Charante EPM, Richard E, Eurelings LS, van Dalen J-W, Ligthart SA, van Bussel EF, et al. Effectiveness of a 6-year multidomain vascular care intervention to prevent dementia (preDIVA): A cluster-randomised controlled trial. Lancet 2016;388(10046):797-805.
149. Andrieu S, Guyonnet S, Coley N, Cantet C, Bonnefoy M, Bordes S, et al. Effect of long-term omega 3 polyunsaturated fatty acid supplementation with or without multidomain intervention on cognitive function in elderly adults with memory complaints (MAPT): A randomised, placebo-controlled trial. Lancet Neurol 2017;16(5):377-89.
150. Rosenberg A, Ngandu T, Rusanen M, Antikainen R, Bäckman L, Havulinna S, et al. Multidomain lifestyle intervention benefits a large elderly population at risk for cognitive decline and dementia regardless of baseline characteristics: The FINGER trial. Alzheimers Dement 2018;14(3):263-70.
151. Kulmala J, Ngandu T, Kivipelto M. Prevention matters: Time for global action and effective implementation. J Alzheimers Dis 2018;64(s1):S191-8.
152. Fitzpatrick AL, Kuller LH, Ives DG, Lopez OL, Jagust W, Breitner JC, et al. Incidence and prevalence of dementia in the Cardiovascular Health Study. J Am Geriatr Soc 2004;52(2):195-204.
153. Kukull WA, Higdon R, Bowen JD, McCormick WC, Teri L, Schellenberg GD, et al. Dementia and Alzheimer disease incidence: A prospective cohort study. Arch Neurol 2002;59(11):1737-46.
154. Sando SB, Melquist S, Cannon A, Hutton M, Sletvold O, Saltvedt I, et al. Risk-reducing effect of education in Alzheimer's disease. Int J Geriatr Psychiatry 2008;23(11):1156-62.
155. Stern Y. Cognitive reserve in ageing and Alzheimer's disease. Lancet Neurol 2012;11(11):1006-12.

156. Hendrie HC, Smith-Gamble V, Lane KA, Purnell C, Clark DO, Gao S. The Association of early life factors and declining incidence rates of dementia in an elderly population of African Americans. J Gerontol B Psychol Sci Soc Sci 2018;16(73, suppl 1):S82-9.
157. Stern Y. What is cognitive reserve? Theory and research application of the reserve concept. J Int Neuropsychol Soc 2002;8:448-60.
158. Stern Y, Arenaza-Urquijo EM, Bartres-Faz D, Belleville S, Cantilon M, Chetelat G, et al. Whitepaper: Defining and investigating cognitive reserve, brain reserve, and brain maintenance. Alzheimers Dement 2018;pii:S1552-5260(18):33491-5.
159. Grzywacz JG, Segel-Karpas D, Lachman ME. Workplace exposures and cognitive function during adulthood: Evidence from National Survey of Midlife Development and the O*NET. J Occup Environ Med 2016;58(6):535-41.
160. Pool LR, Weuve J, Wilson RS, Bültmann U, Evans DA, Mendes de Leon CF. Occupational cognitive requirements and late-life cognitive aging. Neurology 2016;86(15):1386-92.
161. Then FS, Luck T, Luppa M, Arelin K, Schroeter ML, Engel C, et al. Association between mental demands at work and cognitive functioning in the general population: Results of the health study of the Leipzig Research Center for Civilization Diseases. J Occup Med Toxicol 2014;9:23.
162. Fisher GG, Stachowski A, Infurna FJ, Faul JD, Grosch J, Tetrick LE. Mental work demands, retirement, and longitudinal trajectories of cognitive functioning. J Occup Health Psychol 2014;19(2):231-42.
163. McDowell I, Xi G, Lindsay J, Tierney M. Mapping the connections between education and dementia. J Clin Exp Neuropsychol 2007;29(2):127-41.
164. Weuve J, Bennett EE, Ranker L, Gianattasio KZ, Pedde M, Adar SD, et al. Exposure to air pollution in relation to risk of dementia and related outcomes: An updated systematic review of the epidemiologic literature. Environ Health Perspect 2021;129(9):96001.
165. Bernard SM, McGeehin MA. Prevalence of blood lead levels >or= 5 micro g/dL among US children 1 to 5 years of age and socioeconomic and demographic factors associated with blood of lead levels 5 to 10 micro g/dL, Third National Health and Nutrition Examination Survey, 1988-1994. Pediatrics 2003;112(6 Pt 1):1308-13.
166. Griffith M, Tajik M, Wing S. Patterns of agricultural pesticide use in relation to socioeconomic characteristics of the population in the rural U.S. South. Int J Health Serv 2007;37(2):259-77.
167. Harris CD, Watson KB, Carlson SA, Fulton JE, Dorn JM, Elam-Evans L. Adult participation in aerobic and muscle-strengthening physical activities — United States, 2011. Morb Mortal Wkly Rep 2013;62(17):326-30.
168. Menke A, Casagrande S, Geiss L, Cowie CC. Prevalence of and trends in diabetes among adults in the United States, 1988-2012. JAMA 2015;314(10):1021-9.
169. Sims M, Diez Roux AV, Boykin S, Sarpong D, Gebreab SY, Wyatt SB, et al. The socioeconomic gradient of diabetes prevalence, awareness, treatment, and control among African Americans in the Jackson Heart Study. Ann Epidemiol 2011;21(12):892-8.
170. Lee TC, Glynn RJ, Peña JM, Paynter NP, Conen D, Ridker PM, et al. Socioeconomic status and incident type 2 diabetes mellitus: Data from the Women's Health Study. PLoS One 2011;6(12):E27670.
171. Gillespie CD, Hurvitz KA. Prevalence of hypertension and controlled hypertension — United States, 2007–2010. MMWR Suppl 2013;62(3):144-8.
172. Centers for Disease Control and Prevention. Current Cigarette Smoking Among Adults in the United States. Available at: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm. Accessed December 18, 2021.
173. Staff RT, Hogan MJ, Williams DS, Whalley LJ. Intellectual engagement and cognitive ability in later life (the "use it or lose it" conjecture): Longitudinal, prospective study. BMJ 2018;363:k4925.
174. Wang H-X, Xu W, Pei J-J. Leisure activities, cognition and dementia. BBA-Mol Basis Dis 2012;1822(3):482-91.
175. Wang H-X, Karp A, Winblad B, Fratiglioni L. Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: A longitudinal study from the Kungsholmen Project. Am J Epidemiol 2002;155(12):1081-7.
176. Saczynski JS, Pfeifer LA, Masaki K, Korf ES, Laurin D, White L, et al. The effect of social engagement on incident dementia: The Honolulu-Asia Aging Study. Am J Epidemiol 2006;163(5):433-40.
177. Karp A, Paillard-Borg S, Wang H-X, Silverstein M, Winblad B, Fratiglioni L. Mental, physical and social components in leisure activities equally contribute to decrease dementia risk. Dement Geriatr Cogn Disord 2005;21(2):65-73.
178. Di Marco LY, Marzo A, Muñoz-Ruiz M, Ikram MA, Kivipelto M, Ruefenacht D, et al. Modifiable lifestyle factors in dementia: A systematic review of longitudinal observational cohort studies. J Alzheimers Dis 2014;42(1)119-35.
179. James BD, Wilson RS, Barnes LL, Bennett DA. Late-life social activity and cognitive decline in old age. J Int Neuropsychol Soc 2011;17(6):998-1005.
180. Yates LA, Ziser S, Spector A, Orrell M. Cognitive leisure activities and future risk of cognitive impairment and dementia: Systematic review and meta-analysis. Int Psychogeriatr 2016;9:1-16.
181. Ball K, Berch DB, Helmers KF, Jobe JB, Leveck MD, Marsiske M, et al. Effects of cognitive training interventions with older adults: A randomized controlled trial. JAMA 2002;288(18):2271-81.
182. Hall CB, Lipton RB, Sliwinski M, Katz MJ, Derby CA, Verghese J. Cognitive activities delay onset of memory decline in persons who develop dementia. Neurology 2009;73:356-61.
183. Sanjeev G, Weuve J, Jackson JW, VanderWeele TJ, Bennett DA, Grodstein F, et al. Late-life cognitive activity and dementia. Epidemiology 2016;27(5):732-42.
184. Wilson RS, Bennett DA, Bienias JL, Aggarwal NT, Mendes De Leon CF, Morris MC, et al. Cognitive activity and incident AD in a population-based sample of older persons. Neurology 2002;59(12):1910-4.
185. Wang Z, Marseglia A, Shang Y, Dintica C, Patrone C, Xu W. Leisure activity and social integration mitigate the risk of dementia related to cardiometabolic diseases: A population-based longitudinal study. Alzheimer's Dement. 2020;16:316-25.
186. Sajeev G, Weuve J, Jackson JW, VanderWeele TJ, Bennett DA, Grodstein F, et al. Late-life cognitive activity and dementia: a systematic review and bias analysis. Epidemiology. 2016;27(5):732-42.
187. Centers for Disease Control and Prevention. Surveillance Report: Traumatic Brain Injury-related Hospitalizations and Deaths by Age Group, Sex, and Mechanism of Injury, United States 2016/2017. Available at: https://www.cdc.gov/traumaticbraininjury/pdf/TBI-surveillance-report-2016-2017-508.pdf. Accessed September 14, 2021.
188. Fann JR, Ribe AR, Pedersen HS, Fenger-Grøn M, Christensen J, Benros ME, et al. Long-term risk of dementia among people with traumatic brain injury in Denmark: A population-based observational cohort study. Lancet Psychiatry 2018;5(5):424-31.
189. LoBue C, Munro C, Schaffert J, Didehbani N, Hart J, Batjer H, et al. Traumatic brain injury and risk of long-term brain changes, accumulation of pathological markers, and developing dementia: A review. J Alzheimers Dis 2019;70(3):629-54.
190. Plassman BL, Havlik RJ, Steffens DC, Helms MJ, Newman TN, Drosdick D, et al. Documented head injury in early adulthood and risk of Alzheimer's disease and other dementias. Neurology 2000;55(8):1158-66.
191. Teasdale G, Jennett B. Assessment of coma and impaired consciousness: A practical scale. Lancet 1974;2(7872):81-4.

192. Centers for Disease Control and Prevention. Traumatic Brain Injury & Concussion. Potential Effects. Available at: https://www.cdc.gov/traumaticbraininjury/outcomes.html. Accessed December 18, 2021.
193. Barnes DE, Byers AL, Gardner RC Seal KH, Boscardin WJ, Yaffe K. Association of mild traumatic brain injury with and without loss of consciousness with dementia in U.S. military veterans. JAMA Neurol 2018;75(9):1055-61.
194. LoBue C, Wadsworth H, Wilmoth K, Clem M, Hart J Jr, Womack KB. Traumatic brain injury history is associated with earlier age of onset of Alzheimer disease. Clin Neuropsychol 2017;31(1):85-98.
195. Schaffert J, LoBue C, White CL, Chiang H-S, Didehboni N, Lacritz L, et al. Traumatic brain injury history is associated with an earlier age of dementia onset in autopsy-confirmed Alzheimer's disease. Neuropsychology 2018 May;32(4):410-16.
196. Mez J, Daneshvar DH, Abdolmohammadi B, Chua AS, Alosco ML, Kiernan PT, et al. Duration of American football play and chronic traumatic encephalopathy. Ann Neurol 2020;87(1):116-31.
197. Asken BM, Sullan MJ, DeKosky ST, Jaffee MS, Bauer RM. Research gaps and controversies in chronic traumatic encephalopathy: A review. JAMA Neurol 2017;74(10):1255-62.
198. McKee AC, Stein TD, Kiernan PT, Alvarez VE. The neuropathology of chronic traumatic encephalopathy. Brain Pathol 2015;25(3):350-64.
199. McKee AC, Cairns NJ, Dickson DW, Folkerth RD, Keene CD, Litvan I, et al. The first NINDS/NIBIB consensus meeting to define neuropathological criteria for the diagnosis of chronic traumatic encephalopathy. ACTA Neuropathol 2016;131(1):75-86.
200. Sprung J, Knopman DS, Petersen RC, Mielke MM, Weingarten TN, Vassilaki M, et al. Association of hospitalization with long-term cognitive trajectories in older adults. J Am Geriatr Soc 2021;69(3):660-8.
201. James BD, Wilson RS, Capuano AW, Boyle PA, Shah RC, Lamar M, et al. Cognitive decline after elective and nonelective hospitalizations in older adults. Neurology 2019;92(7):e690-e699.
202. Brown CH, Sharrett AR, Coresh J, Schneider ALC, Alonso A, Knopman DS, et al. Association of hospitalization with long-term cognitive and brain MRI changes in the ARIC cohort. Neurology 2015;84:1443-53.
203. Pandharipande PP, Girard TD, Jackson JC, Morandi A, Thompson JL, Pun BT, et al. Long-term cognitive impairment after critical illness. N Engl J Med 2013;369(14):1306-16.
204. Ehlenbach WJ, Hough CL, Crane PK, Haneuse SJPA, Carson SS, Curtis JR, et al. Association between acute care and critical illness hospitalization and cognitive function in older adults. JAMA 2010;(8):763-770.
205. Karnatovskaia LV, Johnson MM, Benzo RP, Gajic O. The spectrum of psychocognitive morbidity in the critically ill: A review of the literature and call for improvement. J Crit Care. 2015;30:130-7.
206. Wolters AE, Slooter AJC, van der Kooi AW, van Djik D. Cognitive impairment after intensive care unit admission: a systematic review. Intensive Care Med 2013;39(3):376-86.
207. Centers for Medicare & Medicaid Services. Preliminary Medicare COVID-19 Data Snapshot: Medicare Claims and Encounter Data: January 1, 2020, to July 24, 2021, Available at: https://www.cms.gov/files/document/medicare-covid-19-data-snapshot-fact-sheet.pdf. Accessed October 18, 2021.
208. Cavallazzi R, Saad M, Marik PE. Delirium in the ICU: An overview. Ann Intensive Care 2012;2(1):49.
209. Briesacher BA, Koethe B, Olivieri-Mui B, Saczynski JS, Fick DM, Devlin JW, et al. Association of positive delirium screening with incident dementia in skilled nursing facilities.
210. Davis DHJ, Muniz Terrera G, Keage H, Rahkonen T, Oinas M, Matthews FE, et al. Delirium is a strong risk factor for dementia in the oldest-old: A population-based cohort study. Brain 2012;135(9):2809-16.
211. Wacker P, Nunes PV, Cabrita H, Forlenza OV. Post-operative delirium is associated with poor cognitive outcome and dementia. Dement Geriatr Cogn Disord 2006;21:221-7.
212. Shi L, Chen S, Ma M, Bao Y, Han Y, Wang Y, et al. Sleep disturbances increase the risk of dementia: A systematic review and meta-analysis. Sleep Med Rev 2018;40:4-16.
213. Sabia S, Fayosse A, Dumurgier J, van Hees VT, Paquet C, Sommerlad A. Association of sleep duration in middle and old age with incidence of dementia. Nat Commun. 2021;12(1):2289.
214. Winer JR, Keters KD, Kennedy G, Jin M, Goldstein-Piekarski A, Poston KL, et al. Association of short and long sleep duration with amyloid-β burden and cognition in aging. JAMA Neurol 2021 Oct 1;78(10):1187-1196.
215. Rehm J, Hasan OSM, Black SE, Shield KD, Schwarzinger M. Alcohol use and dementia: A systematic scoping review. Alz Res Therapy 2019;11:1.
216. Cherbuin N, Kim S, Anstey KJ. Dementia risk estimates associated with measures of depression: A systematic review and meta-analysis. Available at: https://bmjopen.bmj.com/content/5/12/e008853. Accessed December 18, 2021.
217. Thomson RS, Auduong P, Miller AT, Gurgel RK. Hearing loss as a risk factor for dementia: A systematic review. Laryngoscope Investig Otolaryngol. 2017;2(2): 69-79.
218. Administration for Community Living. 2020 Profile of Older Americans: May 2021. Available at: https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf. Accessed November 19, 2021.
219. Gilmore-Bykovskyi A, Croff R, Glover CM, Jackson JD, Resendez J, Perez A, et al. Traversing the aging research and health equity divide: Toward intersectional frameworks of research justice and participation. Gerontologist 2021;gnab107.
220. He W, Goodkind D, Kowal P. U.S. Census Bureau, International Population Reports, P95/16-1, An Aging World: 2015, U.S. Government Publishing Office, Washington, D.C., 2016. Available at: http://www.census.gov/content/dam/Census/library/publications/2016/demo/p95-16-1.pdf. Accessed December 18, 2021.
221. U.S. Census Bureau. 2014 National Population Projections: Downloadable Files. Available at: https://www.census.gov/data/datasets/2014/demo/popproj/2014-popproj.html. Accessed December 18, 2021.
222. Administration on Aging, Administration for Community Living, U.S. Department of Health and Human Services. A Profile of Older Americans: 2016. Available at: https://www.acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2016-Profile.pdf. Accessed December 18, 2021.
223. Guerreiro R, Bras J. The age factor in Alzheimer's disease. Genome Med 2015;7:106.
224. Rajan KB, Weuve J, Barnes LL, McAninch EA, Wilson RS, Evans DA. Population estimate of people with clinical AD and mild cognitive impairment in the United States (2020-2060). Alzheimers Dement 2021;doi:10.1002/alz.12362. Online ahead of print.
225. Hendriks S, Peetoom K, Bakker C, van der Flier WM, Papma JM, Koopmans R, et al. Global prevalence of young-onset dementia: A systematic review and meta-analysis. JAMA Neurol 2021;78(9):1080-90.
226. Plassman BL, Langa KM, Fisher GG, Heeringa SG, Weir DR, Ofstedal MB, et al. Prevalence of dementia in the United States: The Aging, Demographics, and Memory Study. Neuroepidemiology 2007;29(1-2):125-32.
227. Wilson RS, Weir DR, Leurgans SE, Evans DA, Hebert LE, Langa KM, et al. Sources of variability in estimates of the prevalence of Alzheimer’s disease in the United States. Alzheimers Dement 2011;7(1):74-9.
228. Hudomiet P, Hurd M, Rohwedder S. Dementia prevalence in the United States in 2000 and 2012: Estimates based on a nationally representative study. J Gerontol B Psychol Sci Soc Sci 2018;73(Suppl 1)S10-19.

229. James BD, Wilson RS, Boyle PA, Trojanowski JQ, Bennett DA, Schneider JA. TDP-43 stage, mixed pathologies, and clinical Alzheimer's-type dementia. Brain 2016;139(11):2983-93.
230. Serrano-Pozo A, Qian J, Monsell SE, Blacker D, Gomez-Isla T, Betensky RA, et al. Mild to moderate Alzheimer dementia with insufficient neuropathological changes. Ann Neurol 2014;75:597-601.
231. Barnes LL, Leurgans S, Aggarwal NT, Shah RC, Arvanitakis Z, James BD, et al. Mixed pathology is more likely in black than white decedents with Alzheimer dementia. Neurology 2015;85:528-34.
232. Jack CR Jr, Therneau TM, Weigand SD, Wiste HJ, Knopman DS, Vemuri P, et al. Prevalence of biologically vs clinically defined Alzheimer spectrum entities using the National Institute on Aging-Alzheimer's Association Research Framework. JAMA Neurol 2019;76(10):1174-83.
233. Brookmeyer R, Abdalla N, Kawas CH, Corrada MM. Forecasting the prevalence of preclinical and clinical Alzheimer's disease in the United States. Alzheimers Dement 2018;14(2):121-9.
234. Petersen RC, Aisen P, Boeve BF, Geda YE, Ivnik RJ, Knopman DS, et al. Mild cognitive impairment due to Alzheimer disease in the community. Ann Neurol. Aug 2013;74(2):199-208.
235. Rabinovici GD, Gatsonis C, Apgar C, Chaudhary K, Gareen I, Hanna L, et al. Association of amyloid positron emission tomography with subsequent change in clinical management among Medicare beneficiaries with mild cognitive impairment or dementia. JAMA 2019;321(13):1286-94.
236. Kotagal V, Langa KM, Plassman BL, Fisher GG, Giordani BJ, Wallace RB, et al. Factors associated with cognitive evaluations in the United States. Neurology 2015;84(1):64-71.
237. Taylor DH, Jr., Ostbye T, Langa KM, Weir D, Plassman BL. The accuracy of Medicare claims as an epidemiological tool: The case of dementia revisited. J Alzheimers Dis 2009;17(4): 807-15.
238. Gianattasio KZ, Prather C, Glymour MM, Ciarleglio A, Power MC. Racial disparities and temporal trends in dementia misdiagnosis risk in the United States. Alzheimer's & dementia. 2019;5:891-8.
239. Lang L, Clifford A, Wei L, Zhang D, Leung D, Augustine G, et al. Prevalence and determinants of undetected dementia in the community: A systematic literature review and a meta-analysis. BMJ Open 2017;7(2):e011146.
240. Lin PJ, Daly AT, Olchanski N, Cohen JT, Neumann PJ, Faul JD, Fillit HM, Freund KM. Dementia diagnosis disparities by race and ethnicity. Med Care 2021;59(8):679-86.
241. Amjad H, Roth DL, Sheehan OC, Lyketsos CG, Wolff JL, Samus QM. Underdiagnosis of dementia: An observational study of patterns in diagnosis and awareness in US older adults. J Gen Intern Med 2018;33(7):1131-8.
242. Healthy People 2030. Available at: https://health.gov/healthypeople/objectives-and-data/browse-objectives/dementias/increase-proportion-older-adults-dementia-or-their-caregivers-who-know-they-have-it-dia-01. Accessed December 18, 2021.
243. Barrett AM, Orange W, Keller M, Damgaard P, Swerdlow RH. Short-term effect of dementia disclosure: How patients and families describe the diagnosis. J Am Geriatr Soc 2006;54(12):1968-70.
244. Zaleta AK, Carpenter BD, Porensky EK, Xiong C, Morris JC. Agreement on diagnosis among patients, companions, and professionals after a dementia evaluation. Alzheimer Dis Assoc Disord 2012;26(3):232-7.
245. Amjad H, Roth DL, Samus QM, Yasar S, Wolff JL. Potentially unsafe activities and living conditions of older adults with dementia. J Am Geriatr Soc 2016;64(6):1223-32.
246. Alzheimer's Association. 2015 Alzheimer's Disease Facts and Figures. Alzheimer Dement 2015;11(3):332-84.
247. Alzheimer's Association. 2019 Alzheimer's Disease Facts and Figures. Special report: Alzheimer's detection in the primary care setting — connecting patients with physicians. Available at: https://www.alzheimersanddementia.com/article/S1552-5260(19)30031-7/fulltext. Accessed December 18, 2021.
248. Reisberg B, Gauthier S. Current evidence for subjective cognitive impairment (SCI) as the pre-mild cognitive impairment (MCI) stage of subsequently manifest Alzheimer's disease. Int Psychogeriatr 2008;20(1):1-16.
249. Jessen F, Wolfsgruber S, Wiese B, Bickel H, Mösch E, Kaduszkiewicz H, et al. AD dementia risk in late MCI, in early MCI, and in subjective memory impairment. Alzheimers Dement 2014;10(1):76-83.
250. Jessen F, Amariglio RE, van Boxtel M, Breteler M, Ceccaldi M, Chételat G, et al. A conceptual framework for research on subjective cognitive decline in preclinical Alzheimer's disease. Alzheimers Dement 2014;10(6):844-52.
251. Buckley RF, Maruff P, Ames D, Bourgeat P, Martins RN, Masters CL, et al. Subjective memory decline predicts greater rates of clinical progression in preclinical Alzheimer's disease. Alzheimers Dement 2016;12(7):796-804.
252. Gifford KA, Liu D, Lu Z, Tripodis Y, Cantwell NG, Palmisano J, et al. The source of cognitive complaints predicts diagnostic conversion differentially among nondemented older adults. Alzheimers Dement 2014;10(3):319-27.
253. Kaup AR, Nettiksimmons J, LeBlanc ES, Yaffe K. Memory complaints and risk of cognitive impairment after nearly 2 decades among older women. Neurology 2015;85(21):1852-8.
254. Reisberg B, Shulman MB, Torossian C, Leng L, Zhu W. Outcome over seven years of healthy adults with and without subjective cognitive impairment. Alzheimers Dement 2010;6(1):11-24.
255. Fernandez-Blazquez MA, Avila-Villanueva M, Maestu F, Medina M. Specific features of subjective cognitive decline predict faster conversion to mild cognitive impairment. J Alzheimers Dis 2016;52(1):271-81.
256. Jessen F, Amariglio RE, Buckley RF, van der Flier WM, Han Y, Molinuevo JL, et al. The characterisation of subjective cognitive decline. Lancet Neurol 2020;19(3):271-8.
257. Wolfsgruber S, Kleineidam L, Wagner M, Mösch E, Bickel H, Lühmann D, et al. Differential risk of incident Alzheimer's disease dementia in stable versus unstable patterns of subjective cognitive decline. J Alzheimers Dis 2016;54(3): 1135-46.
258. Unpublished data from the 2019-2020 Behavioral Risk Factor Surveillance System survey conducted in 46 states and the District of Columbia, analyzed and provided to the Alzheimer's Association by the Alzheimer's Disease Program, Centers for Disease Control and Prevention.
259. Weuve J, Hebert LE, Scherr PA, Evans DA. Prevalence of Alzheimer disease in U.S. states. Epidemiology 2015;26(1): E4-6.
260. Unpublished tabulations based on data from the Medicare Current Beneficiary Survey for 2018. Prepared under contract by Health Care Cost Institute, December 2021.
261. Rajan KB, Weuve J, Barnes LL, Wilson RS, Evans DA. Prevalence and incidence of clinically diagnosed Alzheimer's disease dementia from 1994 to 2012 in a population study. Alzheimers Dement 2019;15(1):1-7.
262. Hebert LE, Beckett LA, Scherr PA, Evans DA. Annual incidence of Alzheimer disease in the United States projected to the years 2000 through 2050. Alzheimer Dis Assoc Disord 2001;15(4):169-73.
263. Chene G, Beiser A, Au R, Preis SR, Wolf PA, Dufouil C, et al. Gender and incidence of dementia in the Framingham Heart Study from mid-adult life. Alzheimers Dement 2015;11(3): 310-20.
264. Seshadri S, Wolf PA, Beiser A, Au R, McNulty K, White R, et al. Lifetime risk of dementia and Alzheimer's disease. The impact of mortality on risk estimates in the Framingham Study. Neurology 1997;49(6):1498-504.
265. Hebert LE, Scherr PA, McCann JJ, Beckett LA, Evans DA. Is the risk of developing Alzheimer's disease greater for women than for men? Am J Epidemiol 2001;153(2):132-6.
266. Zahodne LB, Schofield PW, Farrell MT, Stern Y, Manly JJ. Bilingualism does not alter cognitive decline or dementia risk among Spanish-speaking immigrants. Neuropsychology 2014;28(2):238-46.

267. Kawas C, Gray S, Brookmeyer R, Fozard J, Zonderman A. Age-specific incidence rates of Alzheimer's disease: The Baltimore Longitudinal Study of Aging. Neurology 2000;54(11):2072-7.
268. Fratiglioni L, Viitanen M, von Strauss E, Tontodonati V, Herlitz A, Winblad B. Very old women at highest risk of dementia and Alzheimer's disease: Incidence data from the Kungsholmen Project, Stockholm. Neurology 1997;48:132-8.
269. Letenneur L, Gilleron V, Commenges D, Helmer C, Orgogozo JM, Dartigues JF. Are sex and educational level independent predictors of dementia and Alzheimer's disease? Incidence data from the PAQUID project. J Neurol Neurosurg Psychiatry 1999;66:177-83.
270. Matthews FE, Stephan BC, Robinson L, Jagger C, Barnes LE, Arthur A, et al. A two decade dementia incidence comparison from the Cognitive Function and Ageing Studies I and II. Nat Commun 2016;7:11398.
271. Mielke MM, Ferretti MT, Iulita MF, Hayden K, Khachaturian AS. Sex and gender in Alzheimer's disease — Does it matter? Alzheimers Dement 2018;14(9):1101-3.
272. Rocca WA. Time, Sex, gender, history, and dementia. Alzheimer Dis Assoc Disord 2017;31(1):76-9.
273. Shaw C, Hayes-Larson E, Glymour MM, Dufouil C, Hohman TJ, Whitmer RA. Evaluation of selective survival and sex/gender differences in dementia incidence using a simulation model. JAMA Netw Open 2021;4(3):e211001.
274. Gilsanz P, Lee C, Corrada MM, Kawas CH, Quesenberry CP, Jr., Whitmer RA. Reproductive period and risk of dementia in a diverse cohort of health care members. Neurology 2019;92(17):e2005-e2014.
275. Mielke MM, Vemuri P, Rocca WA. Clinical epidemiology of Alzheimer's disease: Assessing sex and gender differences. Clin Epidemiol 2014;6:37-48.
276. Rocca WA, Mielke MM, Vemuri P, Miller VM. Sex and gender differences in the causes of dementia: A narrative review. Maturitas 2014;79(2):196-201.
277. Langa KM, Larson EB, Crimmins EM, Faul JD, Levine DA, Kabeto MU, et al. A comparison of the prevalence of dementia in the United States in 2000 and 2012. JAMA Intern Med 2017;177(1):51-8.
278. Launer LJ, Andersen K, Dewey ME, Letenneur L, Ott A, Amaducci LA, et al. Rates and risk factors for dementia and Alzheimer's disease: Results from EURODEM pooled analyses. EURODEM Incidence Research Group and Work Groups. European Studies of Dementia. Neurology 1999;52(1):78-84.
279. Russ TC, Stamatakis E, Hamer M, Starr JM, Kivimaki M, Batty GD. Socioeconomic status as a risk factor for dementia death: Individual participant meta-analysis of 86 508 men and women from the UK. Br J Psychiatry 2013;203(1):10-7.
280. Mielke MM, James BD. Women who participated in the paid labor force have lower rates of memory decline: Working to remember. Neurolgy 2020;95(23):1027-8.
281. Mayeda RM, Mobley TM, Weiss RE, Murchland AR, Berkman LF, Sabbath EL. Association of work-family experience with mid- and late-life memory decline in US women. Neurology 2020;95(23):e3072-e3080.
282. Shaw C, Hayes-Larson E, Glymour MM, Dufouil C, Hohman TJ, Whitmer RA, et al. Evaluation of selective survival and sex/gender differences in dementia incidence using a simulation model. JAMA Netw Open 2021;4(3):e211001.
283. Carter CL, Resnick EM, Mallampalli M, Kalbarczyk A. Sex and gender differences in Alzheimer's disease: Recommendations for future research. J Womens Health 2012;21(10):1018-23.
284. Altmann A, Tian L, Henderson VW, Greicius MD, Alzheimer's Disease Neuroimaging Initiative Investigators. Sex modifies the APOE-related risk of developing Alzheimer disease. Ann Neurol 2014;75(4):563-73.
285. Ungar L, Altmann A, Greicius MD. Apolipoprotein E, gender, and Alzheimer's disease: An overlooked, but potent and promising interaction. Brain Imaging Behav 2014;8(2):262-73.
286. Hohman TJ, Dumitrescu L, Barnes LL, Thambisetty M, Beecham G, Kunkle B, et al. Sex-specific association of apolipoprotein E with cerebrospinal fluid levels of tau. JAMA Neurol 2018;75(8):989-98.
287. Neu SC, Pa J, Kukull W, Beekly D, Kuzma A, Gangadharan P, et al. Apolipoprotein E genotype and sex risk factors for Alzheimer disease: A meta-analysis. JAMA Neurol 2017;74(10):1178-89.
288. Yaffe K, Haan M, Byers A, Tangen C, Kuller L. Estrogen use, APOE, and cognitive decline: Evidence of gene-environment interaction. Neurology 2000;54(10):1949-54.
289. Kang JH, Grodstein F. Postmenopausal hormone therapy, timing of initiation, APOE and cognitive decline. Neurobiol Aging 2012;33(7):1129-37.
290. Dilworth-Anderson P, Hendrie HC, Manly JJ, Khachaturian AS, Fazio S. Diagnosis and assessment of Alzheimer's disease in diverse populations. Alzheimers Dement 2008;4(4):305-9.
291. Steenland K, Goldstein FC, Levey A, Wharton W. A meta-analysis of Alzheimer's disease incidence and prevalence comparing African-Americans and caucasians. J Alzheimers Dis 2015;50(1):71-6.
292. Power MC, Bennett EE, Turner RW, Dowling NM, Ciarleglio A, Glymour MM, et al. Trends in relative incidence and prevalence of dementia across non-Hispanic black and white individuals in the United States, 2000-2016. JAMA Neurology 2021;78(3):275-84.
293. Manly JJ, Mayeux R. Ethnic differences in dementia and Alzheimer's disease. In: Anderson N, Bulatao R, Cohen B, eds. Critical perspectives on racial and ethnic differentials in health in late life. Washington, D.C.: National Academies Press; 2004: p. 95-141.
294. Demirovic J, Prineas R, Loewenstein D, Bean J, Duara R, Sevush S, et al. Prevalence of dementia in three ethnic groups: The South Florida Program on Aging and Health. Ann Epidemiol 2003;13(6):472-78.
295. Harwood DG, Ownby RL. Ethnicity and dementia. Curr Psych Report 2000;2(1):40-5.
296. Perkins P, Annegers JF, Doody RS, Cooke N, Aday L, Vernon SW. Incidence and prevalence of dementia in a multiethnic cohort of municipal retirees. Neurology 1997;49(1):44-50.
297. Potter GG, Plassman BL, Burke JR, Kabeto MU, Langa KM, Llewellyn DJ, et al. Cognitive performance and informant reports in the diagnosis of cognitive impairment and dementia in African Americans and whites. Alzheimers Dement 2009;5(6):445-53.
298. Gurland BJ, Wilder DE, Lantigua R, Stern Y, Chen J, Killeffer EH, et al. Rates of dementia in three ethnoracial groups. Int J Geriatr Psychiatry 1999;14(6):481-93.
299. Haan MN, Mungas DM, Gonzalez HM, Ortiz TA, Acharya A, Jagust WJ. Prevalence of dementia in older latinos: The influence of type 2 diabetes mellitus, stroke and genetic factors. J Am Geriatr Soc 2003;51:169-77.
300. Samper-Ternent R, Kuo YF, Ray LA, Ottenbacher KJ, Markides KS, Al Snih S. Prevalence of health conditions and predictors of mortality in oldest old Mexican Americans and non-Hispanic whites. J Am Med Dir Assn 2012;13(3):254-9.
301. González HM, Tarraf W, Schneiderman N, Fornage M, Vásquez PM, Zeng D, et al. Prevalence and correlates of mild cognitive impairment among diverse Hispanics/Latinos: Study of Latinos-Investigation of Neurocognitive Aging results. Alzheimers Dement 2019;15(12):1507-15.
302. Mehta KM, Yeo GW. Systematic review of dementia prevalence and incidence in United States race/ethnic populations. Alzheimers Dement 2017;13(1):72-83.
303. Yaffe K, Falvey C, Harris TB, Newman A, Satterfield S, Koster A, et al. Effect of socioeconomic disparities on incidence of dementia among biracial older adults: Prospective study. BMJ 2013;347:f7051.
304. Chin AL, Negash S, Hamilton R. Diversity and disparity in dementia: The impact of ethnoracial differences in Alzheimer disease. Alzheimer Dis Assoc Disord 2011;25(3):187-95.
305. Froehlich TE, Bogardus Jr. ST, Inouye SK. Dementia and race: Are there differences between African Americans and Caucasians? J Am Geriatr Soc 2001;49(4):477-84.
306. Glymour MM, Manly JJ. Lifecourse social conditions and racial and ethnic patterns of cognitive aging. Neuropsychol Rev 2008;18(3):223-54.

307. Bailey ZD, Feldman JM, Bassett MT. How structural racism works - Racist policies as a root cause of U.S. racial health inequities. N Engl J Med 2021;384(8):768-73.
308. Bailey ZD, Krieger N, Agenor M, Graves J, Linos N, Bassett MT. Structural racism and health inequities in the USA: Evidence and interventions. Lancet 2017;389(10077):1453-63.
309. Caunca MR, Odden MC, Glymour MM, Elfassy T, Kershaw KN, Sidney S, et al. Association of racial residential segregation throughout young adulthood and cognitive performance in middle-aged participants in the CARDIA study. JAMA Neurology 2020;77(8):1000-7.
310. Lamar M, Lerner AJ, James BD, Yu L, Glover CM, Wilson RS, et al. Relationship of early-life residence and educational experience to level and change in cognitive functioning: Results of the Minority Aging Research Study. J Gerontol B Psychol Sci Soc Sci 2020;75(7):e81-e92.
311. Peterson RL, George KM, Barnes LL, Gilsanz P, Mayeda ER, Glymour MM, Mungas D, Whitmer RA. Timing of school desegregation and late-life cognition in the Study of Healthy Aging in African Americans (STAR). JAMA Netw Open 2021;4(10):e2129052.
312. Lines LM, Sherif NA, Wiener JM. Racial and Ethnic Disparities Among Individuals with Alzheimer's Disease in the United States: A literature review. Research Triangle Park, NC: RTI Press; 2014.
313. Zhang Z, Hayward MD, Yu YL. Life course pathways to racial disparities in cognitive impairment among older Americans. J Health Soc Behav 2016;57(2):184-99.
314. Clark PC, Kutner NG, Goldstein FC, Peterson-Hazen S, Garner V, Zhang R, et al. Impediments to timely diagnosis of Alzheimer's disease in African Americans. J Am Geriatr Soc 2005;53(11):2012-7.
315. Fitten LJ, Ortiz F, Ponton M. Frequency of Alzheimer's disease and other dementias in a community outreach sample of Hispanics. J Am Geriatr Soc 2001;49(10):1301-8.
316. Matthews KA, Xu W, Gaglioti AH, Holt JB, Croft JB, Mack D, et al. Racial and ethnic estimates of Alzheimer's disease and related dementias in the United States (2015-2060) in adults aged ≥ 65 years. Alzheimers Dement 2019;15(1):17-24.
317. Mayeda ER, Glymour MM, Quesenberry CP, Whitmer RA. Inequalities in dementia incidence between six racial and ethnic groups over 14 years. Alzheimers Dement 2016;12(3):216-24.
318. Mayeda ER, Glymour MM, Quesenberry CP, Jr., Whitmer RA. Heterogeneity in 14-year dementia incidence between Asian American subgroups. Alzheimer Dis Assoc Disord 2017;31(3):181-6.
319. Ajrouch KJ, Zahodne LB, Antonucci TC. Arab American cognitive aging: Opportunities for advancing research on Alzheimer's disease disparities. Innov Aging 2017 Nov;1(3):igx034.
320. Wolters FJ, Chibnik LB, Waziry R, Anderson R, Berr C, Beiser A, et al. Twenty-seven-year time trends in dementia incidence in Europe and the United States. The Alzheimer Cohorts Consortium. Neurology 2020;95(5):e519-e531.
321. Rocca WA, Petersen RC, Knopman DS, Hebert LE, Evans DA, Hall KS, et al. Trends in the incidence and prevalence of Alzheimer's disease, dementia, and cognitive impairment in the United States. Alzheimers Dement 2011;7(1):80-93.
322. Wu YT, Beiser AS, Breteler MMB, Fratiglioni L, Helmer C, Hendrie HC, et al. The changing prevalence and incidence of dementia over time: Current evidence. Nat Rev Neurol 2017;13(6):327-39.
323. Schrijvers EM, Verhaaren BF, Koudstaal PJ, Hofman A, Ikram MA, Breteler MM. Is dementia incidence declining? Trends in dementia incidence since 1990 in the Rotterdam Study. Neurology 2012;78(19):1456-63.
324. Qiu C, von Strauss E, Backman L, Winblad B, Fratiglioni L. Twenty-year changes in dementia occurrence suggest decreasing incidence in central Stockholm, Sweden. Neurology 2013;80(20):1888-94.
325. Satizabal CL, Beiser AS, Chouraki V, Chene G, Dufouil C, Seshadri S. Incidence of dementia over three decades in the Framingham Heart Study. N Engl J Med 2016;374:523-32.
326. Cerasuolo JO, Cipriano LE, Sposato LA, Kapral MK, Fang J, Gill SS, et al. Population-based stroke and dementia incidence trends: Age and sex variations. Alzheimers Dement 2017;13(10):1081-8.
327. Derby CA, Katz MJ, Lipton RB, Hall CB. Trends in dementia incidence in a birth cohort analysis of the Einstein Aging Study. JAMA Neurol 2017;74(11):1345-51.
328. Ahmadi-Abhari S, Guzman-Castillo M, Bandosz P, Shipley MJ, Muniz-Terrera G, Singh-Manoux A, et al. Temporal trend in dementia incidence since 2002 and projections for prevalence in England and Wales to 2040: Modelling study. BMJ 2017;358:j2856.
329. Sullivan KJ, Dodge HH, Hughes TF, Chang CH, Zhu X, Liu A, et al. Declining incident dementia rates across four population-based birth cohorts. J Gerontol A Biol Sci Med Sci 2019;74(9):1439-45.
330. Matthews FE, Arthur A, Barnes LE, Bond J, Jagger C, Robinson L, et al. A two-decade comparison of prevalence of dementia in individuals aged 65 years and older from three geographical areas of England: Results of the Cognitive Function and Ageing Study I and II. Lancet 2013;382(9902):1405-12.
331. Wiberg P, Waern M, Billstedt E, Östling S, Skoog I. Secular trends in the prevalence of dementia and depression in Swedish septuagenarians 1976–2006. Psychol Med 2013;43:2627-34.
332. Wimo A, Sjölund BM, Sköldunger A, Qiu C, Klarin I, Nordberg G, et al. Cohort effects in the prevalence and survival of people with dementia in a rural area in Northern Sweden. J Alzheimers Dis 2016;50:387-96.
333. Hall KS, Gao S, Baiyewu O, Lane KA, Gureje O, Shen J, et al. Prevalence rates for dementia and Alzheimer's disease in African Americans: 1992 versus 2000. Alzheimers Dement 2009;5(3):227-33.
334. van den Kommer TN, Deeg DJH, van der Flier WM, and Comijs HC. Time trend in persistent cognitive decline: Results from the longitudinal aging study Amsterdam. J Gerontol B Psychol Sci Soc Sci 2018;73(Suppl 1)S57-64.
335. Sekita A, Ninomiya T, Tanizaki Y, Doi Y, Hata J, Yonemoto K, et al. Trends in prevalence of Alzheimer's disease and vascular dementia in a Japanese community: The Hisayama Study. Acta Psychiatr Scand 2010;122(4):319-25.
336. Gao S, Burney HN, Callahan CM, Purnell CE, Hendrie HC. Incidence of dementia and Alzheimer disease over time: A meta-analysis. J Am Geriatr Soc. Jul 2019;67(7):1361-9.
337. Crimmins EM, Saito Y, Kim JK, Zhang Y, Sasson I, Hayward MD. Educational differences in the prevalence of dementia and life expectancy with dementia in the United States: Changes from 2000 to 2010. J Gerontol B Psychol Sci Soc Sci 2018;73 (Suppl 1)S20-28.
338. Choi H, Schoeni RF, Martin LG, Langa K M. Trends in the prevalence and disparity in cognitive limitations of Americans 55-69 years old. J Gerontol B Psychol Sci Soc Sci 2018;73 (Suppl 1):S29-37.
339. Zheng H. A new look at cohort trend and underlying mechanisms in cognitive functioning. J Gerontol B 2021;76(8):1652-63.
340. Freedman VA, Kasper JD, Spillman BC, Plassman BL. Short-term changes in the prevalence of probable dementia: An analysis of the 2011–2015 National Health and Aging Trends Study. J Gerontol B Psychol Sci Soc Sci 2018;73(Suppl 1) S48-56.
341. Langa KM. Is the risk of Alzheimer's disease and dementia declining? Alzheimers Res Ther 2015;7(1):34.
342. Larson EB, Yaffe K, Langa KM. New insights into the dementia epidemic. N Engl J Med 2013;369(24):2275-7.
343. Sheffield KM, Peek MK. Changes in the prevalence of cognitive impairment among older Americans, 1993-2004: Overall trends and differences by race/ethnicity. Am J Epidemiol 2011;174(3):274-83.
344. Weuve J, Rajan KB, Barnes LL, Wilson RS, Evans DA. Secular trends in cognitive performance in older black and white U.S. adults, 1993-2012: Findings from the Chicago Health and Aging Project. J Gerontol B Psychol Sci Soc Sci 2018;73 (Suppl 1):S73-81.

345. Prince MJ, Wimo A, Guerchet M, Ali G-C, Wu Y-T, Prina M. World Alzheimer Report 2015: The Global Impact of Dementia: An Analysis of Prevalence, Incidence, Cost and Trends; 2015.
346. de Erausquin GA, Snyder H, Carrillo M, Hosseini AA, Brugha TS, Seshadri S. The chronic neuropsychiatric sequelae of COVID-19: The need for a prospective study of viral impact on brain functioning. Alzheimers Dement 2021;17(6):1056-65.
347. U.S. Census Bureau. 2017 National Population Projections Tables. Available at: https://www.census.gov/data/tables/2017/demo/popproj/2017-summary-tables.html. Accessed December 18, 2021.
348. The World Bank. Fertility, total (births per woman)—US. Available at: https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=US. Accessed September 13, 2021.
349. Lee R, Mason A. Populaiton aging and the generational economy: A global perspective. 2011.
350. Dall TM, Gallo PD, Chakrabarti R, West T, Semilla AP, Storm MV. An aging population and growing disease burden will require a large and specialized health care workforce by 2025. Health Aff (Millwood) 2013;32(11):2013-20.
351. Agree EM, Glaser K. Demography of Informal Cregiving. International Handbook of Population Aging. pp. 647-68. 2006.
352. Rogers L, Wilder K. Shift in Working-Age Population Relative to Older and Younger Americans. Created: June 25, 2020. Available at: https://www.census.gov/library/stories/2020/06/working-age-population-not-keeping-pace-with-growth-in-older-americans.html. Accessed: September 13, 2021.
353. Administration for Community Living. 2019 Profile of Older Americans. May 2020 Available at: https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2019ProfileOlderAmericans508.pdf. Accessed September 13, 2021.
354. Bauman 2016. https://www.census.gov/newsroom/blogs/random-samplings/2016/03/shift-toward-greater-educational-attainment-for-women-began-20-years-ago.html.
355. Population Reference Bureau 2012. https://www.prb.org/resources/why-is-the-u-s-birth-rate-declining/.
356. Tom SE, Phadke M, Hubbard RA, Crane PK, Stern Y, Larson EB. Association of demographic and early-life socioeconomic factors by birth cohort with dementia incidence among US adults born between 1893 and 1949. JAMA Netw Open 2020;3(7):e2011094.
357. Skoog I. Dementia incidence: The times, they are a-changing. Nature Rev Neurol 2016;12:316-8. Available at: https://www.nature.com/articles/nrneurol.2016.55.
358. Sullivan KJ, Dodge HH, Hughes TF, Chang C-C, Zhu X, Liu A, et al. Declining incident dementia rates across four population-based birth cohort. J Gerontol A Biol Sci Med Sci 2019;74(9):1439-45.
359. Xu JQ, Murphy SL, Kochanek KD, Arias E. Mortality in the United States, 2018. NCHS Data Brief; No. 355. Hyattsville, MD: National Center for Health Statistics. 2020.
360. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. CDC WONDER online database: About Underlying Cause of Death, 1999-2019. Available at: https://wonder.cdc.gov/ucd-icd10.html. Accessed December 28, 2021.
361. Mokdad AH, Ballestros K, Echko M, Glenn S, Olsen HE, Mullany E. The state of US health, 1990-2016: Burden of diseases, injuries, and risk factors among US states. JAMA 2018;319(14):1444-72.
362. World Health Organization. International Statistical Classification of Diseases and Related Health Problems. 10th revision. 2nd edition. WHO Press: Geneva, Switzerland; 2004.
363. Kramarow EA, Tejada-Vera B. Dementia mortality in the United States, 2000–2017. National Vital Statistics Reports; Vol 68 No 2. Hyattsville, MD: National Center for Health Statistics. 2019. Available at: https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_02-508.pdf. Accessed December 18, 2021.
364. Burns A, Jacoby R, Luthert P, Levy R. Cause of death in Alzheimer's disease. Age Ageing 1990;19(5):341-4.
365. Brunnstrom HR, Englund EM. Cause of death in patients with dementia disorders. Eur J Neurol 2009;16(4):488-92.
366. Ives DG, Samuel P, Psaty BM, Kuller LH. Agreement between nosologist and Cardiovascular Health Study review of deaths: Implications of coding differences. J Am Geriatr Soc 2009;57(1):133-9.
367. Romero JP, Benito-Leon J, Louis ED, Bermejo-Pareja F. Under reporting of dementia deaths on death certificates: A systematic review of population-based cohort studies. J Alzheimers Dis 2014;41(1):213-21.
368. Ganguli M, Rodriguez EG. Reporting of dementia on death certificates: A community study. J Am Geriatr Soc 1999;47(7):842-9.
369. Stokes AC, Weiss J, Lundberg DJ, Xie W, Kim JK, Preston SH, et al. Estimates of the association of dementia with US mortality levels using linked survey and mortality records. JAMA Neurology 2020;77(12):1543-50.
370. Unpublished tabulations based on data from the 100% National Sample Medicare Fee-for-Service Beneficiaries for 2019. Prepared under contract by Health Care Cost Institute, December 2021.
371. Weuve J, Hebert LE, Scherr PA, Evans DA. Deaths in the United States among persons with Alzheimer's disease (2010-2050). Alzheimers Dement 2014;10(2):E40-6.
372. Arrighi HM, Neumann PJ, Lieberburg IM, Townsend RJ. Lethality of Alzheimer disease and its impact on nursing home placement. Alzheimer Dis Assoc Disord 2010;24(1):90-5.
373. Centers for Disease Control and Prevention. National Center for Health Statistics. Excess Deaths Associated with COVID-19. Available at: https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm. Accessed December 18, 2021.
374. U.S, Department of Health and Human Services. Centers for Disease Control and Prevention. National Center for Health Statistics. CDC WONDER online database: About Provisional Mortality Statistics, 2018 Through Last Month. Available at https://wonder.cdc.gov/mcd-icd10-provisional.html. Accessed February 7, 2022.
375. Tejada-Vera B. Mortality from Alzheimer's disease in the United States: Data for 2000 and 2010. National Center for Health Statistics Data Brief, No. 116. National Center for Health Statistics, Hyattsville, MD; 2013.
376. Taylor C, Greenlund S, McGuire L, Lu H, Croft J. Deaths from Alzheimer's disease — United States, 1999-2014. MMWR Morb Mortal Wkly Rep. 2017;66:521-6.
377. Mitchell SL, Teno JM, Miller SC, Mor V. A national study of the location of death for older persons with dementia. J Am Geriatr Soc 2005;53(2):299-305.
378. U.S. Burden of Disease Collaborators, Mokdad AH, Ballestros K, et al. The state of U.S. health, 1990-2016: Burden of diseases, injuries, and risk factors among U.S. states. JAMA 2018;319(14):1444-1472.
379. James KC, Foster SD. Weighing up disability. Lancet 1999;354(9173):87-8.
380. Barker C, Green A. Opening the debate on DALYs (disability-adjusted life years). Health Policy Plan 1996;11(2):179-83.
381. Gaugler JE, Kane RL, Kane RA. Family care for older adults with disabilities: Toward more targeted and interpretable research. Int J Aging Hum Dev 2002;54(3):205-31.
382. Schulz R, Quittner AL. Caregiving through the life-span: Overview and future directions. Health Psychol 1998;17:107-11.
383. Friedman EM, Shih RA, Langa KM, Hurd MD. U.S. prevalence and predictors of informal caregiving for dementia. Health Aff 2015;34(10):1637-41.
384. Spillman B, Wolff J, Freedman VA, Kasper JD. Informal Caregiving for Older Americans: An Analysis of the 2011 National Health and Aging Trends Study. Available at: https://aspe.hhs.gov/pdf-report/informal-caregiving-older-americans-analysis-2011-national-health-and-aging-trends-study. Accessed December 18, 2021.
385. Walmart: 2021 Annual Report. Available at: https://s2.q4cdn.com/056532643/files/doc_financials/2021/ar/WMT_2021_AnnualReport.pdf. Accessed December 18, 2021.

386. McDonald's Corporation Report 2020. Available at: https://corporate.mcdonalds.com/content/dam/gwscorp/assets/investors/financial-information/annual-reports/2020%20Annual%20Report.pdf. Accessed December 18, 2021.
387. Jutkowitz E, Kane RL, Gaugler JE, MacLehose RF, Dowd B, Kuntz KM. Societal and family lifetime cost of dementia: Implications for policy. J Am Geriatr Soc 2017;65(10):2169-75.
388. Official Data Foundation. CPI inflation calculator. Available at: http://www.in2013dollars.com/2017-dollars-in-2018?amount=139765. Accessed December 18, 2021.
389. Deb A, Thornton JD, Sambamoorthi U, Innes K. Direct and indirect cost of managing Alzheimer's disease and related dementias in the United States. Expert Rev Pharmacoecon Outcomes Res 2017;17(2):189-202.
390. Greenwood N, Smith R. Motivations for being informal carers of people living with dementia: A systematic review of qualitative literature. BMC Geriatr 2019;19(1):169.
391. Kasper JD, Freedman VA, Spillman BC, Wolff JL. The disproportionate impact of dementia on family and unpaid caregiving to older adults. Health Aff 2015;34(10):1642-49.
392. Ornstein KA, Wolff JL, Bollens-Lund E, Rahman OK, Kelley AS. Spousal caregivers are caregiving alone in the last years of life. Health Aff (Millwood) 2019;38(6):964-72.
393. Alzheimer's Association. Issues Brief: LGBT and Dementia. Available at: https://www.alz.org/media/Documents/lgbt-dementia-issues-brief.pdf. Accessed December 18, 2021.
394. Kasper JD, Freedman VA, Spillman BC. Disability and Care Needs of Older Americans by Dementia Status: An Analysis of the 2011 National Health and Aging Trends Study. U.S. Department of Health and Human Services; 2014. Available at: http://aspe.hhs.gov/report/disability-and-care-needs-older-americans-dementia-status-analysis-2011-national-health-and-aging-trends-study. Accessed December 18, 2021.
395. Rabarison KM, Bouldin ED, Bish CL, McGuire LC, Taylor CA, Greenlund KJ. The economic value of informal caregiving for persons with dementia: Results from 38 states, the District of Columbia, and Puerto Rico, 2015 and 2016 BRFSS. Am J Public Health 2018;108(10):1370-7.
396. Langa KM, Plassman BL, Wallace RB, Herzog AR, Heeringa SG, Ofstedal MB, et al. The Aging, Demographics, and Memory Study: Study design and methods. Neuroepidemiology 2005;25(4):181-91.
397. Fisher GG, Franks MM, Plassman BL, Brown SL, Potter GG, Llewellyn D, et al. Caring for individuals with dementia and cognitive impairment, not dementia: Findings from The Aging, Demographics, and Memory Study. J Am Geriatr Soc 2011;59(3):488-94.
398. National Alliance for Caregiving in Partnership with the Alzheimer's Association. Dementia Caregiving in the U.S. Bethesda, MD. Available at: https://www.caregiving.org/wp-content/uploads/2020/05/Dementia-Caregiving-in-the-US_February-2017.pdf. Accessed December 18, 2021.
399. Unpublished data from the 2015, 2016 and 2017 Behavioral Risk Factor Surveillance System survey, analyzed by and provided to the Alzheimer's Association by the Alzheimer's Disease and Healthy Aging Program (AD+HP), Centers for Disease Control and Prevention (CDC).
400. Riffin C, Van Ness PH, Wolff JL, Fried T. Family and other unpaid caregivers and older adults with and without dementia and disability. J Am Geriatr Soc 2017;65(8):1821-8.
401. National Poll on Healthy Aging. Dementia Caregivers: Juggling, Delaying and Looking Forward. Available at: http://www.healthyagingpoll.org/sites/default/files/2017-10/NPHA_Caregivers-Report-PROOF_101817_v2.pdf. Accessed December 18, 2021.
402. Caregiving in the U.S.: 2020 Report. Available at: https://www.aarp.org/content/dam/aarp/ppi/2020/05/full-report-caregiving-in-the-united-states.doi.10.26419-2Fppi.00103.001.pdf. Accessed December 18, 2021.
403. Ohno S, Chen Y, Sakamaki H, Matsumaru N, Yoshino M, Tsukamoto K. Burden of caring for Alzheimer's disease or dementia patients in Japan, the US, and EU: Results from the National Health and Wellness Survey: A cross-sectional survey. J Med Econ 2021;24(1):266-78.
404. National Alliance for Caregiving and AARP. Caregiving in the U.S.: Unpublished data analyzed under contract for the Alzheimer's Association; 2009.
405. Alzheimer's Association. 2014 Alzheimer's Disease Facts and Figures. Special Report: Women and Alzheimer's Disease. Available at: https://www.alzheimersanddementia.com/article/S1552-5260(14)00062-4/fulltext. Accessed December 18, 2021.
406. Xiong C, Biscardi M, Astell A, Nalder E, Cameron JI, Mihailidis A, et al. Sex and gender differences in caregiving burden experienced by family caregivers of persons with dementia: A systematic review. PLoS One 2020;15(4):e0231848.
407. Pinquart M, Sörensen. Gender differences in caregiver stressors, social resources, and health: An updated meta-analysis. J Gerontol B Psychol Sci Soc Sci 2006;61(1):P33-45.
408. Ma M, Dorstyn D, Ward L, Prentice S. Alzheimer's disease and caregiving: A meta-analytic review comparing the mental health of primary carers to controls. Aging Ment Health 2017;5:1-11.
409. Brewster GS, Bonds K, McLennon S, Moss KO, Epps F, Lopez RP. Missing the mark: The complexity of African American dementia family caregiving. J Fam Nurs 2020;26(4):294-301.
410. Parker LJ, Fabius CD. Racial differences in respite use among black and white caregivers for people living with dementia. J Aging Health 2020;32(10):1667-75.
411. Rote SM, Angel JL, Moon H, Markides K. Caregiving across diverse populations: New evidence from the National Study of Caregiving and Hispanic EPESE. Innov Aging 2019;3(2):igz033.
412. Gilmore-Bykovskyi A, Johnson R, Walljasper L, Block L, Werner N. Underreporting of gender and race/ethnicity differences in NIH-funded dementia caregiver support interventions. Am J Alzheimers Dis Other Demen 2018;33(3):145-152.
413. Dilworth-Anderson P, Moon H, Aranda MP. Dementia caregiving research: Expanding and reframing the lens of diversity, inclusivity, and intersectionality. Gerontologist 2020;60(5):797-805.
414. Rote SM, Angel JL, Kim J, Markides KS. Dual trajectories of dementia and social support in the Mexican-origin population. Gerontologist 2021;61(3):374-82.
415. Moraes Balbim G, Magallanes M, Marques IG, Ciruelas K, Aguiñaga S, Guzman J, et al. Sources of caregiving burden in middle-aged and older Latino caregivers. J Geriatr Psychiatry Neurol 2020;33(4):185-94.
416. Chen C, Thunell J, Zissimopoulos J. Changes in physical and mental health of Black, Hispanic, and White caregivers and non-caregivers associated with onset of spousal dementia. Alzheimers Dement (N Y) 2020;6(1):e12082.
417. Fabius CD, Wolff JL, Kasper JD. Race differences in characteristics and experiences of black and white caregivers of older Americans. Gerontologist 2020;60(7):1244-53.
418. Liu C, Badana ANS, Burgdorf J, Fabius CD, Roth DL, Haley WE. Systematic review and meta-analysis of racial and ethnic differences in dementia caregivers' well-being. Gerontologist 2021;61(5):e228-e243.
419. Alhasan DM, Hirsch JA, Jackson CL, Miller MC, Cai B, Lohman MC. Neighborhood characteristics and the mental health of caregivers cohabiting with care recipients diagnosed with Alzheimer's disease. Int J Environ Res Public Health 2021;18(3):913.
420. Lewis JP, Manson SM, Jernigan VB, Noonan C. "Making sense of a disease that makes no sense": Understanding Alzheimer's disease and related disorders among caregivers and providers within Alaska native communities. Gerontologist 2021;61(3):363-73.
421. Bonner GJ, Freels S, Ferrans C, Steffen A, Suarez ML, Dancy BL, et al. Advance care planning for African American caregivers of relatives with dementias: Cluster randomized controlled trial. Am J Hosp Palliat Care 2021;38(6):547-56.
422. Bonds K, Song MK, Whitlatch CJ, Lyons KS, Kaye JA, Lee CS. Patterns of dyadic appraisal of decision-making involvement of African American persons living with dementia. Gerontologist 2021;61(3):383-91.

423. Liu J, Lou Y, Wu B, Mui A. "I've been always strong to conquer any suffering:" Challenges and resilience of Chinese American dementia caregivers in a life course perspective. Aging Ment Health 2021;25(9):1716-24.
424. Portacolone E, Palmer NR, Lichtenberg P, Waters CM, Hill CV, Keiser S, et al. Earning the trust of African American communities to increase representation in dementia research. Ethn Dis 2020;30(Suppl 2):719-34.
425. Park VT, Grill JD, Zhu J, Nguyen K, Nam B, Tsoh J, et al. Asian Americans and Pacific Islanders' perspectives on participating in the CARE recruitment research registry for Alzheimer's disease and related dementias, aging, and caregiving research. Alzheimers Dement (N Y) 2021;7(1):e12195.
426. Epps F, Heidbreder V, Alexander K, Tomlinson A, Freeman V, Williams N. A dementia-friendly church: How can the African American church support families affected by dementia? Dementia (London) 2021;20(2):556-69.
427. Martinez IL, Gonzalez EA, Quintero C, Vania MJ. The experience of Alzheimer's disease family caregivers in a Latino community: Expectations and incongruences in support services. J Gerontol B Psychol Sci Soc Sci 2021;gbab170.
428. Withers M, Cortez-Sanchez K, Herrera J, Ringman JM, Segal-Gidan F. "My backpack is so heavy": Experiences of Latino caregivers of family with early-onset Alzheimer's. J Am Geriatr Soc. 2021;69(6):1539-47.
429. Guest MA, Smith MP. In Our Community, Dementia Speaks: Pilot of a person-centered training targeting African-American caregivers of persons-living with dementia (innovative practice). Dementia (London) 2021;20(1):391-7.
430. Fields NL, Xu L, Richardson VE, Parekh R, Ivey D, Calhoun M. Utilizing the Senior Companion Program as a platform for a culturally informed caregiver intervention: Results from a mixed methods pilot study. Dementia (London) 2021;20(1):161-87.
431. Meyer OL, Sun M, Do T, Ho JN, Dinh B-T, Nguyen S, et al. Community-engaged research with Vietnamese Americans to pilot-test a dementia caregiver intervention. J Cross Cult Gerontol 2020;35(4):479-492.
432. Epps F, Alexander K, Brewster GS, Parker LJ, Chester M, Tomlinson A, et al. Promoting dementia awareness in African-American faith communities. Public Health Nurs 2020;37(5):715-21.
433. Gilmore-Bykovskyi A, Johnson R, Walljasper L, Block L, Werner N. Underreporting of gender and race/ethnicity differences in NIH-funded dementia caregiver support interventions. Am J Alzheimers Dis Other Demen 2018;33(3):145-52.
434. National Alliance for Caregiving and AARP. Caregiving in the U.S. (2015 Report). Available at: https://www.aarp.org/content/dam/aarp/ppi/2015/caregiving-in-the-united-states-2015-report-revised.pdf. Accessed December 18, 2021.
435. Spillman BC, Freedman VA, Kasper JD, Wolff JL. Change over time in caregiving networks for older adults with and without dementia. J Gerontol B Psychol Sci Soc Sci 2020;75(7):1563-72.
436. Port CL, Zimmerman S, Williams CS, Dobbs D, Preisser JS, Williams SW. Families filling the gap: Comparing family involvement for assisted living and nursing home residents with dementia. Gerontologist 2005;45(Special Issue 1):87-95.
437. Schulz R, Belle SH, Czaja SJ, McGinnis KA, Stevens A, Zhang S. Long-term care placement of dementia patients and caregiver health and well-being. JAMA 2004;292(8):961-7.
438. Rattinger GB, Schwartz S, Mullins CD, Corcoran C, Zuckerman IH, Sanders C, et al. Dementia severity and the longitudinal costs of informal care in the Cache County population. Alzheimers Dement 2015;11(8):946-54.
439. Rattinger GB, Fauth EB, Behrens S, Sanders C, Schwartz S, Norton MC, et al. Closer caregiver and care-recipient relationships predict lower informal costs of dementia care: The Cache County Dementia Progression Study. Alzheimers Dement 2016;12(8):917-24.
440. Wolff JL, Mulcahy J, Huang J, Roth DL, Covinsky K, Kasper JD. Family Caregivers of Older Adults, 1999-2015: Trends in characteristics, circumstances, and role-related appraisal. Gerontologist 2018;58(6):1021-32.
441. Jutkowitz E, Gaugler JE, Trivedi AN, Mitchell LL, Gozalo P. Family caregiving in the community up to 8-years after onset of dementia. BMC Geriatr 2020;20(1):216.
442. Jutkowitz E, Gozalo P, Trivedi A, Mitchell L, Gaugler JE. The effect of physical and cognitive impairments on caregiving. Med Care 2020;58(7):601-9.
443. Ornstein K, Gaugler JE. The problem with “problem behaviors”: A systematic review of the association between individual patient behavioral and psychological symptoms and caregiver depression and burden within the dementia patient-caregiver dyad. Int Psychogeriatr 2012;24(10):1536-52.
444. Vaingankar JA, Chong SA, Abdin E, Picco L, Shafie S, Seow E, et al. Psychiatric morbidity and its correlates among informal caregivers of older adults. Compr Psychiatry 2016;68:178-85.
445. Feast A, Moniz-Cook E, Stoner C, Charlesworth G, Orrell M. A systematic review of the relationship between behavioral and psychological symptoms (BPSD) and caregiver well-being. Int Psychogeriatr 2016;28(11):1761-74.
446. Schulz R, Beach SR. Caregiving as a risk factor for mortality: The Caregiver Health Effects Study. JAMA 1999;282:2215-60.
447. Vitaliano PP, Zhang J, Scanlan JM. Is caregiving hazardous to one’s physical health? A meta-analysis. Psychol Bull 2003;129(6):946-72.
448. Liu W, Gallagher-Thompson D. Impact of dementia caregiving: Risks, strains, and growth. In: Qualls SH, Zarit SH, eds. Aging families and caregiving. Hoboken, NJ: John Wiley & Sons, Inc.; 2009: p. 85-112.
449. Pinquart M, Sörensen S. Associations of stressors and uplifts of caregiving with caregiver burden and depressive mood: A meta-analysis. J Gerontol B Psychol Sci Soc Sci 2003;58(2):112-28.
450. Sörensen S, Duberstein P, Gill D, Pinquart M. Dementia care: Mental health effects, intervention strategies, and clinical implications. Lancet Neurol 2006;5(11):961-73.
451. Goren A, Montgomery W, Kahle-Wrobleski K, Nakamura T, Ueda K. Impact of caring for persons with Alzheimer’s disease or dementia on caregivers’ health outcomes: Findings from a community based survey in Japan. BMC Geriatr 2016;16:122.
452. Alzheimer’s Association. 2016 Alzheimer’s Disease Facts and Figures. Alzheimer Dement 2016;12(4):459-509.
453. Jones RW, Lebrec J, Kahle-Wrobleski K, Dell’Agnello G, Bruno G, Vellas B, et al. Disease progression in mild dementia due to Alzheimer disease in an 18-month observational study (GERAS): The impact on costs and caregiver outcomes. Dement Geriatr Cogn Dis Extra 2017;7(1):87-100.
454. Leggett AN, Meyer OL, Bugajsky BC, Polenick CA. Accentuate the positive: The association between informal and formal supports and caregiving gains. J Appl Gerontol 2021;40(7):763-71.
455. Quinn C, Toms G. Influence of positive aspects of dementia caregiving on caregivers' well-being: A systematic review. Gerontologist 2019;59(5):e584-e596.
456. Zarit SH. Positive aspects of caregiving: More than looking on the bright side. Aging Ment Health 2012;16(6):673-74.
457. Cheng ST, Mak EP, Lau RW, Ng NS, Lam LC. Voices of Alzheimer caregivers on positive aspects of caregiving. Gerontologist 2016;56(3):451-60.
458. Monin JK, Schulz R, Feeney BC. Compassionate love in individuals with Alzheimer's disease and their spousal caregivers: Associations with caregivers' psychological health. Gerontologist 2015;55(6):981-9.
459. Roth DL, Dilworth-Anderson P, Huang J, Gross AL, Gitlin LN. Positive aspects of family caregiving for dementia: Differential item functioning by race. J Gerontol B Psychol Sci Soc Sci 2015;70(6):813-9.
460. Lloyd J, Patterson T, Muers J. The positive aspects of caregiving in dementia: A critical review of the qualitative literature. Dementia (London) 2016;15(6):1534-61.
461. Yu DSF, Cheng ST, Wang J. Unravelling positive aspects of caregiving in dementia: An integrative review of research literature. Int J Nurs Stud 2018;79:1-26.

462. van den Kieboom R, Snaphaan L, Mark R, Bongers I. The trajectory of caregiver burden and risk factors in dementia progression: A systematic review. J Alzheimers Dis 2020;77(3):1107-15.
463. Polenick CA, Min L, Kales HC. Medical Comorbidities of dementia: Links to caregivers' emotional difficulties and gains. J Am Geriatr Soc 2020;68(3):609-13.
464. Sheehan OC, Haley WE, Howard VJ, Huang J, Rhodes JD, Roth DL. Stress, burden, and well-being in dementia and nondementia caregivers: Insights from the Caregiving Transitions Study. Gerontologist 2021;61(5):670-9.
465. Sallim AB, Sayampanathan AA, Cuttilan A, Chun-Man Ho R. Prevalence of mental health disorders among caregivers of patients with Alzheimer disease. J Am Med Dir Assoc 2015;16(12):1034-41.
466. Atteih S, Mellon L, Hall P, Brewer L, Horgan F, Williams D, et al. Implications of stroke for caregiver outcomes: Findings from the ASPIRE-S Study. Int J Stroke 2015;10:918-23.
467. Thunyadee C, Sitthimongkol Y, Sangon S, Chai-Aroon T, Hegadoren KM. Predictors of depressive symptoms and physical health in caregivers of individuals with schizophrenia. J Nurs Health Sci 2015;17:412-9.
468. Harris ML, Titler MG, Hoffman GJ. Associations between Alzheimer's disease and related dementias and depressive symptoms of partner caregivers. J Appl Gerontol 2021;40(7):772-80.
469. Vitaliano PP, Ustundag O, Borson S. Objective and subjective cognitive problems among caregivers and matched non-caregivers. Gerontologist 2017;57(4):637-47.
470. Dassel KB, Carr DC, Vitaliano P. Does caring for a spouse with dementia accelerate cognitive decline? Findings from the Health and Retirement Study. Gerontologist 2017;57(2):319-28.
471. Arthur PB, Gitlin LN, Kairalla JA, Mann WC. Relationship between the number of behavioral symptoms in dementia and caregiver distress: What is the tipping point? Int Psychogeriatr 2018;30(8):1099-1107.
472. Gillespie R, Mullan J, Harrison L. Managing medications: The role of informal caregivers of older adults and people living with dementia: A review of the literature. J Clin Nurs 2014;23(23-24):3296-308.
473. Alsaeed D, Jamieson E, Gul MO, Smith FJ. Challenges to optimal medicines use in people living with dementia and their caregivers: A literature review. Int J Pharm 2016;512(2):396-404.
474. Polenick CA, Stanz SD, Leggett AN, Maust DT, Hodgson NA, Kales HC. Stressors and resources related to medication management: Associations with spousal caregivers' role overload. Gerontologist. 2020;60(1):165-73
475. Aston L, Hilton A, Moutela T, Shaw R, Maidment I. Exploring the evidence base for how people with dementia and their informal carers manage their medication in the community: A mixed studies review. BMC Geriatr 2017;17(1):242.
476. Liu C, Fabius CD, Howard VJ, Haley WE, Roth DL. Change in social engagement among incident caregivers and controls: Findings from the Caregiving Transitions Study. J Aging Health 2021;33(1-2):114-24.
477. Badana ANS, Marino V, Haley WE. Racial differences in caregiving: Variation by relationship type and dementia care status. J Aging Health 2019;31(6):925-46.
478. Sheehan OC, Haley WE, Howard VJ, Huang J, Rhodes JD, Roth DL. Stress, burden, and well-being in dementia and nondementia caregivers: Insights from the Caregiving Transitions Study. Gerontologist 2021;61(5):670-9.
479. Gaugler JE, Mittelman MS, Hepburn K, Newcomer R. Clinically significant changes in burden and depression among dementia caregivers following nursing home admission. BMC Medicine 2010;8:85.
480. Mausbach BT, Chattillion EA, Ho J, Flynn LM, Tiznado D, von Känel R, et al. Why does placement of persons with Alzheimer's disease into long-term care improve caregivers' well-being? Examination of psychological mediators. Psychol Aging 2014;29(4):776-86.
481. Peacock SC. The experience of providing end-of-life care to a relative with advanced dementia: An integrative literature review. Palliat Support Care 2013;11(2):155-68.
482. Schulz R, Mendelsohn AB, Haley WE, Mahoney D, Allen RS, Zhang S, et al. End-of-life care and the effects of bereavement on family caregivers of persons with dementia. N Engl J Med 2003;349(20):1936-42.
483. Kumar V, Ankuda CK, Aldridge MD, Husain M, Ornstein KA. Family Caregiving at the End of Life and Hospice Use: A national study of Medicare beneficiaries. J Am Geriatr Soc 2020;68(10):2288-96.
484. Kelley AS, McGarry K, Bollens-Lund E, Rahman O-K, Husain M, Ferreira KB, et al. Residential setting and the cumulative financial burden of dementia in the 7 years before death. J Am Geriatr Soc 2020;68(6):1319-24.
485. Fonareva I, Oken BS. Physiological and functional consequences of caregiving for relatives with dementia. Int Psychogeriatr 2014;26(5):725-47.
486. Parker LJ, Fabius C, Rivers E, Taylor JL. Is dementia-specific caregiving compared with non-dementia caregiving associated with physical difficulty among caregivers for community-dwelling adults? J Appl Gerontol 2021;7334648211014352.
487. Peng H-L, Chang Y-P. Sleep disturbance in family caregivers of individuals with dementia: A review of the literature. Perspect Psychiatr C 2012;49(2):135-46.
488. Gao C, Chapagain NY, Scullin MK. Sleep Duration and Sleep Quality in caregivers of patients with dementia: A systematic review and meta-analysis. JAMA Netw Open 2019;2(8):e199891.
489. Välimäki TH, Martikainen JA, Hongisto K, Väätäinen S, Sintonen H, Koivisto AM. Impact of Alzheimer's disease on the family caregiver's long-term quality of life: Results from an ALSOVA follow-up study. Qual Life Res 2016;25(3):687-97.
490. Bremer P, Cabrera E, Leino-Kilpi H, Lethin C, Saks K, Sutcliffe C. Informal dementia care: Consequences for caregivers' health and health care use in 8 European countries. Health Policy 2015;119(11):1459-71.
491. Dassel KB, Carr DC. Does dementia caregiving accelerate frailty? Findings from the Health and Retirement Study. Gerontologist 2016;56(3):444-50.
492. Fredman L, Bertrand RM, Martire LM, Hochberg M, Harris EL. Leisure-time exercise and overall physical activity in older women caregivers and non-caregivers from the Caregiver-SOF Study. Prev Med 2006;43:226-9.
493. von Kanel R, Dimsdale JE, Mills PJ, Ancoli-Israel S, Patterson TL, Mausbach BT, et al. Effect of Alzheimer caregiving stress and age on frailty markers interleukin-6, C-reactive protein, and D-dimer. J Gerontol A Biol Sci Med Sci 2006;61(9):963-9.
494. Kiecolt-Glaser JK, Dura JR, Speicher CE, Trask OJ, Glaser R. Spousal caregivers of dementia victims: Longitudinal changes in immunity and health. Psychosom Med 1991;53:345-62.
495. Kiecolt-Glaser JK, Marucha PT, Mercado AM, Malarkey WB, Glaser R. Slowing of wound healing by psychological stress. Lancet 1995;346(8984):1194-6.
496. Vitaliano PP, Scanlan JM, Zhang J, Savage MV, Hirsch IB, Siegler I. A path model of chronic stress, the metabolic syndrome, and coronary heart disease. Psychosom Med 2002;64:418-35.
497. Mausbach BT, Romero-Moreno R, Bos T, von Känel R, Ziegler MG, Allison MA, et al. Engagement in pleasant leisure activities and blood pressure: A 5-year longitudinal study in Alzheimer caregivers. Psychosom Med. 2017;79(7):735-41.
498. Shaw WS, Patterson TL, Ziegler MG, Dimsdale JE, Semple SJ, Grant I. Accelerated risk of hypertensive blood pressure recordings among Alzheimer caregivers. J Psychosom Res 1999;46(3):215-27.
499. Mausbach BT, Roepke SK, Ziegler MG, Milic M, Von Kanel R, Dimsdale JE, et al. Association between chronic caregiving stress and impaired endothelial function in the elderly. J Am Coll Cardiol 2010;55(23):2599-606.

500. Allen AP, Curran EA, Duggan Á, Cryan JF, Chorcoráin AN, Dinan TG, et al. A systematic review of the psychobiological burden of informal caregiving for patients with dementia: Focus on cognitive and biological markers of chronic stress. Neurosci Biobehav Rev 2017;73:123-164.
501. Roth DL, Sheehan OC, Haley WE, Jenny NS, Cushman M, Walston JD. Is family caregiving associated with inflammation or compromised immunity? A meta-analysis. Gerontologist 2019;59(5):e521-e534.
502. Roth DL, Haley WE, Sheehan OC, Huang J, Rhodes JD, Durda P, et al. The transition to family caregiving and its effect on biomarkers of inflammation. Proc Natl Acad Sci USA 2020;117(28):16258-63.
503. Schubert CC, Boustani M, Callahan CM, Perkins AJ, Hui S, Hendrie HC. Acute care utilization by dementia caregivers within urban primary care practices. J Gen Intern Med 2008;23(11):1736-40.
504. Zhu CW, Scarmeas N, Ornstein K, Albert M, Brandt J, Blacker D, et al. Health-care use and cost in dementia caregivers: Longitudinal results from the Predictors Caregiver Study. Alzheimers Dement 2015;11(4):444-54.
505. Meyer K, Gassoumis Z, Wilber K. The differential effects of caregiving intensity on overnight hospitalization. West J Nurs Res 2021;1939459211002907.
506. Leggett AN, Sonnega AJ, Lohman MC. Till death do us part: Intersecting health and spousal dementia caregiving on caregiver mortality. J Aging Health 2020;32(7-8):871-9.
507. Roth DL, Fredman L, Haley WE. Informal caregiving and its impact on health: A reappraisal from population-based studies. Gerontologist 2015;55(2):309-19.
508. Christakis NA, Allison PD. Mortality after the hospitalization of a spouse. N Engl J Med 2006;354:719-30.
509. Perkins M, Howard VJ, Wadley VG, Crowe M, Safford MM, Haley WE, et al. Caregiving strain and all-cause mortality: Evidence from the REGARDS Study. J Gerontol B Psychol Sci Soc Sci 2013;68(4):504-12.
510. Gaugler JE, Jutkowitz E, Peterson CM, Zmora R. Caregivers dying before care recipients with dementia. Alzheimers Dement (NY) 2018;4:688-93.
511. AARP, Family Caregiving and Out-of-Pocket Costs: 2016 Report. Available at: https://www.aarp.org/content/dam/aarp/research/surveys_statistics/ltc/2016/family-caregiving-costs-fact-sheet.doi.10.26419%252Fres.00138.002.pdf. Accessed December 18, 2021.
512. Albert SM. Are medical care expenses higher for spouses who provide dementia care? Am J Geriatr Psychiatry 2021;29(5):476-7.
513. Chu J, Benjenk I, Chen J. Incremental health care expenditures of the spouses of older adults with Alzheimer's diseases and related dementias (ADRD). Am J Geriatr Psychiatry 2021;29(5):462-72.
514. Stall NM, Kim SJ, Hardacre KA, Shah PS, Straus SE, Bronskill SE, et al. Association of informal caregiver distress with health outcomes of community-dwelling dementia care recipients: A systematic review. J Am Geriatr So 2019;67(3):609-17.
515. Amjad H, Mulcahy J, Kasper JD, Burgdorf J, Roth DL, Covinsky K, et al. Do caregiving factors affect hospitalization risk among disabled older adults? J Am Geriatr Soc 2021;69(1):129-39.
516. Hennelly N, Cooney A, Houghton C, O'Shea E. Personhood and Dementia Care: A qualitative evidence synthesis of the perspectives of people with dementia. Gerontologist 2021;61(3):e85-e100.
517. Gaugler JE, Jutkowitz E, Shippee TP, Brasure M. Consistency of dementia caregiver intervention classification: An evidence-based synthesis. Int Psychogeriatr 2017;29(1):19-30.
518. Gitlin LN, Hodgson N. Caregivers as Therapeutic Agents in Dementia Care: The Evidence-Base for Interventions Supporting their Role. In: Gaugler JE, Kane RL, eds. Family Caregiving in the New Normal. Philadelphia, Pa.: Elsevier, Inc.; 2015: p. 305-56.
519. Williams F, Moghaddam N, Ramsden S, De Boos D. Interventions for reducing levels of burden amongst informal carers of persons with dementia in the community: A systematic review and meta-analysis of randomised controlled trials. Aging Ment Health. 2019;23(12):1629-42.
520. Kaddour L, Kishita N, Schaller A. A meta-analysis of low-intensity cognitive behavioral therapy-based interventions for dementia caregivers. Int Psychogeriatr 2019;31(7):961-76.
521. Nguyen H, Terry D, Phan H, Vickers J, McInerney F. Communication training and its effects on carer and care-receiver outcomes in dementia settings: A systematic review. J Clin Nurs. 2019;28(7-8):1050-69.
522. Jütten LH, Mark RE, Wicherts JM, Sitskoorn MM. The effectiveness of psychosocial and behavioral interventions for informal dementia caregivers: Meta-analyses and meta-regressions. J Alzheimers Dis 2018;66(1):149-72.
523. Maslow K. Translating Innovation to Impact: Evidence-Based Interventions to Support People with Alzheimer's Disease and their Caregiver at Home and in the Community. Washington, D.C.: Administration on Aging; 2012. Available at: https://www.agingresearch.org/app/uploads/2017/12/50820Compliant20AoA-White-Paper20for20Release.pdf. Accessed December 18, 2021.
524. Rosalynn Carter Institute for Caregiving. Available at: https://www.rosalynncarter.org/. Accessed December 18, 2021.
525. Liew TM, Lee CS. Reappraising the efficacy and acceptability of multicomponent interventions for caregiver depression in dementia: The utility of network meta-analysis. Gerontologist 2019;59(4):e380-e392.
526. Larson EB, Stroud C. Meeting the challenge of caring for persons living with dementia and their care partners and caregivers: A report from the National Academies of Sciences, Engineering, and Medicine. JAMA 2021;325(18):1831-2.
527. Patnode CD, Perdue LA, Rossom RC, Rushkin MC, Redmond N, Thomas RG. Screening for cognitive impairment in older adults: Updated evidence report and systematic review for the US Preventive Services Task Force. JAMA 2020;323(8):764-85.
528. Cheng S-T, Li K-K, Losada A, Zhang F, Au A, Thompson LW, et al. The effectiveness of nonpharmacological interventions for informal dementia caregivers: An updated systematic review and meta-analysis. Psychol Aging 2020;35(1):55-77.
529. Walter E, Pinquart M. How effective are dementia caregiver interventions? An updated comprehensive meta-analysis. Gerontologist 2020;60(8):609-19.
530. Kessler AS, Mock G, Hendricks D, Robbins L, Kaur H, Potter JF, et al. Translating the REACH OUT dementia caregiver intervention into a primary care setting: A pilot study. Aging Ment Health 2021;25(8):1483-92.
531. Lee M, Ryoo JH, Chung M, Anderson JG, Rose K, Williams IC. Effective interventions for depressive symptoms among caregivers of people with dementia: A systematic review and meta-analysis. Dementia (London) 2020;19(7):2368-98.
532. Cheng S-T, Zhang F. A comprehensive meta-review of systematic reviews and meta-analyses on nonpharmacological interventions for informal dementia caregivers. BMC Geriatr 2020;20(1):137.
533. Perales-Puchalt J, Barton K, Ptomey L, Niedens M, Yeager A, Gilman L, et al. Effectiveness of "Reducing Disability in Alzheimer's Disease" Among Dyads With Moderate Dementia. J Appl Gerontol 2021;40(10):1163-71.
534. Bass DM, Hornick T, Kunik M, Judge KS, Primetica B, Kearney K, et al. Findings from a real-world translation study of the evidence-based "Partners in Dementia Care". Innov Aging 2019;3(3):igz031.
535. Hodgson N, Gitlin LN (in press). Implementing and sustaining family care programs in real world settings: Barriers and facilitators. In J. E. Gaugler (Ed.), Bridging the Family Care Gap. Academic Press: San Diego, CA.
536. Fauth EB, Jackson MA, Walberg DK, Lee NE, Easom LR, Alston G, et al. External validity of the New York University Caregiver Intervention: Key caregiver outcomes across multiple demonstration projects. J Appl Gerontol 2019;38(9):1253-81.

537. Hodgson NA, Petrovsky DV, Finegan K, Kallmyer BA, Pike J, Fazio S. One call makes a difference: An evaluation of the Alzheimer's Association National Helpline on dementia caregiver outcomes. Patient Educ Couns 2021;104(4):896-902.
538. Boustani M, Alder CA, Solid CA. Agile implementation: A blueprint for implementing evidence-based healthcare solutions. J Am Geriatr Soc 2018;66(7):1372-6.
539. Boots LM, de Vugt ME, van Knippenberg RJ, Kempen GI, Verhey FR. A systematic review of internet-based supportive interventions for caregivers of patients with dementia. Int J Geriatr Psych 2015;29(4):331-44.
540. Griffiths PC, Whitney MK, Kovaleva M, Hepburn K. Development and implementation of tele-savvy for dementia caregivers: A Department of Veterans Affairs Clinical Demonstration Project. Gerontologist 2016;56(1):145-54.
541. Gaugler JE, Zmora R, Mitchell LL, Finlay JM, Peterson CM, McCarron H, et al. Six-month effectiveness of remote activity monitoring for persons living with dementia and their family caregivers: An experimental mixed methods study. Gerontologist 2019;59(1):78-89
542. Waller A, Dilworth S, Mansfield E, Sanson-Fisher R. Computer and telephone delivered interventions to support caregivers of people with dementia: A systematic review of research output and quality. BMC Geriatr 2017;17(1):265.
543. Hopwood J, Walker N, McDonagh L, Rait G, Walters K, Iliffe S, et al. Internet-based interventions aimed at supporting family caregivers of people with dementia: Systematic review. J Med Internet Res 2018;20(6):e216.
544. Leng M, Zhao Y, Xiao H, Li C, Wang Z. Internet-based supportive interventions for family caregivers of people with dementia: Systematic review and meta-analysis. J Med Internet Res 2020;22(9):e19468.
545. Pleasant M, Molinari V, Dobbs C, Meng H, Hyer K. Effectiveness of online dementia caregivers training programs: A systematic review. Geriatr Nurs 2020;S0197-4572(20)30209-3.
546. Etxeberria I, Salaberria K, Gorostiaga A. Online support for family caregivers of people with dementia: A systematic review and meta-analysis of RCTs and quasi-experimental studies. Aging Ment Health 2021;25(7):1165-80.
547. Rising KL, Salcedo VJ, Amadio G, Casten R, Chang AM, Gentsch A, et al. Living through the pandemic: The voices of persons with dementia and their caregivers. J Appl Gerontol 2021;7334648211036399.
548. Fortinsky RH, Gitlin LN, Pizzi LT, Piersol CV, Grady J, Robison JT, et al. Effectiveness of the care of persons with dementia in their environments intervention when embedded in a publicly funded home- and community-based service program. Innov Aging 2020;4(6):igaa053.
549. Gaugler JE, Potter T, Pruinelli L. Partnering with caregivers. Clin Geriatr Med 2014;30(3):493-515.
550. Gitlin LN, Marx K, Stanley IH, Hodgson N. Translating evidence-based dementia caregiving interventions into practice: State-of-the-science and next steps. Gerontologist 2015;55(2):210-26.
551. Wethington E, Burgio LD. Translational research on caregiving: Missing links in the translation process. In: Gaugler JE, Kane RL, eds. Family caregiving in the new normal. Philadelphia, Pa.: Elsevier, Inc; 2015: p. 193-210.
552. Zarit SH. Past is prologue: How to advance caregiver interventions. Aging Ment Health 2017;16:1-6.
553. Kishita N, Hammond L, Dietrich CM, Mioshi E. Which interventions work for dementia family carers? An updated systematic review of randomized controlled trials of carer interventions. Int Psychogeriatr 2018;30(11):1679-96.
554. Zarit SH, Lee JE, Barrineau MJ, Whitlatch CJ, Femia EE. Fidelity and acceptability of an adaptive intervention for caregivers: An exploratory study. Aging Ment Health 2013;17(2):197-206.
555. Van Mierlo LD, Meiland FJ, Van Hout HP, Dröes RM. Toward an evidence-based implementation model and checklist for personalized dementia care in the community. Int Psychogeriatr 2016;28(5):801-13.
556. Gaugler JE, Reese M, Tanler R. Care to Plan: An online tool that offers tailored support to dementia caregivers. Gerontologist 2016;56(6):1161-74.
557. Jennings LA, Ramirez KD, Hays RD, Wenger NS, Reuben DB. Personalized goal attainment in dementia care: Measuring what persons with dementia and their caregivers want. J Am Geriatr Soc 2018;66(11):2120-7.
558. Whitlatch CJ, Orsulic-Jeras S. Meeting the informational, educational, and psychosocial support needs of persons living with dementia and their family caregivers. Gerontologist 2018;58(suppl_1):S58-73.
559. Akarsu NE, Prince MJ, Lawrence VC, Das-Munshi J. Depression in carers of people with dementia from a minority ethnic background: Systematic review and meta-analysis of randomised controlled trials of psychosocial interventions. Int J Geriatr Psychiatry 2019;34(6):790-806.
560. Llanque SM, Enriquez M. Interventions for Hispanic caregivers of patients with dementia: A review of the literature. Am J Alzheimers Dis Other Demen 2012;27(1):23-32.
561. Napoles AM, Chadiha L, Eversley R, Moreno-John G. Reviews: Developing culturally sensitive dementia caregiver interventions: Are we there yet? Am J Alzheimers Dis Other Dement 2010;25:389-406.
562. Luchsinger JA, Burgio L, Mittelman M, Dunner I, Levine JA, Hoyos C, et al. Comparative effectiveness of 2 interventions for Hispanic caregivers of persons with dementia. J Am Geriatr Soc 2018;66(9):1708-15.
563. Fredriksen-Goldsen KI, Jen S, Bryan AEB, Goldsen J. Cognitive impairment, Alzheimer's disease, and other dementias in the lives of lesbian, gay, bisexual and transgender (LGBT) older adults and their caregivers: Needs and competencies. J Appl Gerontol 2018;37(5):545-69.
564. U.S. Department of Health and Human Services. National Research Summit on Care, Services and Supports for Persons with Dementia and their Caregivers. Available at: https://aspe.hhs.gov/national-research-summit-care-services-and-supports-persons-dementia-and-their-caregivers. Accessed December 18, 2021.
565. Young HM, Bell JF, Whitney RL, Ridberg RA, Reed SC, Vitaliano PP. Social determinants of health: Underreported heterogeneity in systematic reviews of caregiver interventions. Gerontologist 2020;60(Suppl 1):S14-S28.
566. Brewster GS, Epps F, Dye CE, Hepburn K, Higgins MK, Parker ML. The effect of the "Great Village" on psychological outcomes, burden, and mastery in African American caregivers of persons living with dementia. J Appl Gerontol 2020;39(10):1059-68.
567. The Lewin Group. Process Evaluation of the Older Americans Act Title IIIE-National Family Caregiver Support Program: Final Report, 2016. Available at: https://acl.gov/sites/default/files/programs/2017-02/NFCSP_Final_Report-update.pdf. Accessed December 18, 2021.
568. Stone RI. Factors affecting the future of family caregiving in the United States. In: JE Gaugler, RL Kane, eds. Family Caregiving in the New Normal. San Diego, CA: Elsevier, Inc; 2015: p. 57-77.
569. Gaugler JE (2021). Supporting family care for older adults: Building a better bridge. In J. E. Gaugler (Ed.). Bridging the Family Care Gap (pp. 427-452). Academic Press.
570. Alzheimer's Association. Alzheimer's Association Dementia Care Practice Recommendations. Available at: https://www.alz.org/media/Documents/alzheimers-dementia-care-practice-recommendations.pdf. Accessed December 18, 2021.
571. Camp CJ. Denial of human rights: We must change the paradigm of dementia care. Clin Gerontol 2019;42(3):221-3.
572. Gaugler JE, Bain LJ, Mitchell L, Finlay J, Fazio S, Jutkowitz E, et al. Reconsidering frameworks of Alzheimer's dementia when assessing psychosocial outcomes. Alzheimers Dement (NY) 2019;5:388-97.
573. Burton A, Ogden M, Cooper C. Planning and enabling meaningful patient and public involvement in dementia research. Curr Opin Psychiatry 2019;32(6):557-62.

574. Greenberg NE, Wallick A, Brown LM. Impact of COVID-19 pandemic restrictions on community-dwelling caregivers and persons with dementia. Psychol Trauma 2020;12(S1):S220-S221.
575. Bacsu J-D, O'Connell ME, Webster C, Poole L, Wighton MB, Sivananthan S. A scoping review of COVID-19 experiences of people living with dementia. Can J Public Health 2021;112(3):400-11.
576. Macchi ZA, Ayele R, Dini M, Lamira J, Katz M, Pantilat SZ, et al. Lessons from the COVID-19 pandemic for improving outpatient neuropalliative care: A qualitative study of patient and caregiver perspectives. Palliat Med 2021;35(7):1258-66.
577. Hwang Y, Connell LM, Rajpara AR, Hodgson NA. Impact of COVID-19 on Dementia caregivers and factors associated with their anxiety symptoms. Am J Alzheimers Dis Other Demen 2021;36:15333175211008768.
578. Gaugler JE. Our vast family care system for the elderly is at risk of collapse. Available at: https://www.startribune.com/our-vast-family-care-system-for-the-elderly-is-about-to-collapse/572221182/. Accessed December 18, 2021.
579. Sadarangani T, Zhong J, Vora P, Missaelides L. "Advocating every single day" so as not to be forgotten: Factors supporting resiliency in adult day service centers amidst COVID-19-related closures. J Gerontol Soc Work 2021;64(3):291-302.
580. Gaugler JE, Marx K, Dabelko-Schoeny H, Parker L, Anderson KA, Albers E, et al. COVID-19 and the need for adult day services. J Am Med Dir Assoc 2021;22(7):1333-7.
581. Monin JK, Ali T, Syed S, Piechota A, Lepore M, Mourgues C, et al. Family communication in long-term care during a pandemic: Lessons for enhancing emotional experiences. Am J Geriatr Psychiatry 2020;S1064-7481(20)30478-4.
582. Savla J, Roberto KA, Blieszner R, McCann BR, Hoyt E, Knight AL. Dementia caregiving during the "stay-at-home" phase of COVID-19 pandemic. J Gerontol B Psychol Sci Soc Sci 2021;76(4):e241-e245.
583. Mitchell LL, Albers EA, Birkeland RW, Peterson CM, Stabler H, Horn B, et al. Caring for a relative with dementia in long-term care during COVID-19. J Am Med Dir Assoc 2021 Dec 17;S1525-8610(21)01013-6. doi: 10.1016/j.jamda.2021.11.026. Accessed January 13, 2022.
584. Weems JA, Rhodes S, Powers JS. Dementia caregiver virtual support-an implementation evaluation of two pragmatic models during COVID-19. Geriatrics (Basel) 2021;6(3):80.
585. Masoud SS, Meyer KN, Sweet LM, Prado PJ, White CL. "We don't feel so alone": A qualitative study of virtual memory cafés to support social connectedness among individuals living with dementia and care partners during COVID-19. Front Public Health 2021;9:660144.
586. Liss JL, Seleri Assunção S, Cummings J, Atri A, Geldmacher DS, Candela SF, et al. Practical recommendations for timely, accurate diagnosis of symptomatic Alzheimer's disease (MCI and dementia) in primary care: A review and synthesis. J Intern Med 2021;290(2):310-334.
587. Bernstein A, Rogers KM, Possin KL, Steele NZR, Ritchie CS, Kramer JH et al. Dementia assessment and management in primary care settings: a survey of current provider practices in the United States. BMC Health Serv Res 2019;19: 919.
588. Drabo EF, Barthold D, Joyce G, Ferido P, Chui HC, Zissimopoulos J. Longitudinal analysis of dementia diagnosis and specialty care among racially diverse Medicare beneficiaries. Alzheimers Dement 2019;15:1402-11.
589. 2020 Alzheimer's disease facts and figures. Alzheimers Dement 2020;doi:10.1002/alz.12068.
590. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis. National and Regional Projections of Supply and Demand for Geriatricians: 2013-2025. Available at: https://bhw.hrsa.gov/sites/default/files/bhw/health-workforce-analysis/research/projections/. Accessed October 24, 2021.
591. Dall TM, Storm MV, Chakrabarti R, Drogan O, Keran CM, Donofri PD, et al. Supply and demand analysis of the current and future U.S. neurology workforce. Neurology 2013;81:470-78.
592. Moye J, Karel MJ, Stamm KE, Qualls SH, Segal DL, Tazeau YN, et al. Workforce analysis of psychological practice with older adults: Growing crisis requires urgent action. Train Educ Prof Psychol. 2019;13(1):46-55.
593. Beydoun MA, Beydoun HA, Gamaldo AA, Rostant O, Dore GA, Zonderman AB, et al. Nationwide inpatient prevalence, predictors and outcomes of Alzheimer's disease among older adults in the United States, 2002–2012. J Alzheimers Dis 2015;48(2):361-75.
594. U.S. Centers for Medicare & Medicaid Services. State Level Chronic Conditions Table: Prevalence, Medicare Utilization and Spending, 2008-2018. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main.html. Accessed December 18, 2021.
595. Rao A, Manteau-Rao M, Aggarwal NT. Dementia neurology deserts: What are they and where are they located in the US? Alzheimers Dement. 2017;13(suppl 7):P509.
596. American Society of Geriatrics. Geriatrics workforce by the numbers. Available at: https://www.americangeriatrics.org/geriatrics-profession/about-geriatrics/geriatrics-workforce-numbers. Accessed December 18, 2021.
597. Institute of Medicine. Retooling for an Aging America: Building the Health Care Workforce. Washington, D.C.: The National Academies Press 2008. Available at: http://www.nationalacademies.org/hmd/reports/2008/retooling-for-an-aging-america-building-the-health-care-workforce.aspx. Accessed December 18, 2021.
598. American Association of Nurse Practitioners (AANP). NP Fact Sheet 2021. Available at: https://www.aanp.org/about/all-about-nps/np-fact-sheet. Accessed October 24, 2021.
599. French DD, LaMantia MA, Livin LR, Herceg D, Alder CA, Boustani MA. Healthy Aging Brain Center improved care coordination and produced net savings. Health Aff 2014;33(4):613-8.
600. Jennings LA, Laffan AM, Schlissel AC, Colligan E, Tan Z, Wenger NS, et al. Health care utilization and cost outcomes of a comprehensive dementia care program for Medicare beneficiaries. JAMA Int Med 2019;179:161-6.
601. Possin KL, Merrilees JJ, Dulaney S, Bonasera SJ, Chiong W, Lee K, et al. Effect of collaborative dementia care via telephone and internet on quality of life, caregiver well-being, and health care use: The Care Ecosystem Randomized Clinical Trial. JAMA Intern Med 2019;179(12):1658-67.
602. Khatutsky G, Wiener J, Anderson W, Akhmerova V, Jessup EA, Squillace MR. Understanding direct care workers: A snapshot of two of America's most important jobs: Certified nursing assistants and home health aides. Washington, D.C.: U.S. Department of Health and Human Services; 2011.
603. Stone R. The Long-Term Care Workforce: From accidental to valued profession. In: Wolf D, Folbre N, eds. Universal Coverage of Long-Term Care in the United States: Can We Get There from Here? New York, NY: Russell Sage Foundation; 2012: 155-178.
604. Jones AL, Dwyer LL, Bercovitz AR, Strahan GW. The National Nursing Home Survey: 2004 Overview. Vital Health Stat 13 2009;(167):1-155.
605. Kramer NA, Smith MC. Training nursing assistants to care for nursing home residents with dementia. In: Molinari V, editor. Professional Psychology in Long-Term Care. New York, N.Y.: Hatherleigh Press; 2000: p. 227-56.
606. McCabe MP, Davison TE, George K. Effectiveness of staff training programs for behavioral problems among older people with dementia. Aging Ment Health 2007;11(5):505-19.
607. Carnahan JL, Slaven JE, Callahan CM, Tu W, Torke AM. Transitions from skilled nursing facility to home: The relationship of early outpatient care to hospital readmission. J Am Med Dir Assoc. 2017;18(10):853-859.
608. Feltner C, Jones CD, Cené CW, Zheng ZJ, Sueta CA, Coker-Schwimmer EJ, et al. Transitional care interventions to prevent readmissions for persons with heart failure: a systematic review and meta-analysis. Ann Intern Med. 2014;160(11):774-84.

609. Murtaugh CM, Deb P, Zhu C, Peng TR, Barrón Y, Shah S, et al. Reducing readmissions among heart failure patients discharged to home health care: Effectiveness of early and intensive nursing services and early physician follow-up. Health Serv Res. 2017;52(4):1445-72.
610. Weller C, Almeida B, Cohen M, Stone R. Making Care Work Pay. Available at: https://www.ltsscenter.org/wp-content/uploads/2020/09/Making-Care-Work-Pay-Report-FINAL.pdf. Accessed December 18, 2021.
611. Beck C, Ortigara A, Mercer S, Shue V. Enabling and empowering certified nursing assistants for quality dementia care. Int J Geriatr Psychiatry 1999;14(3):197-211.
612. Warshaw GA, Bragg EJ. Preparing the health care workforce to care for adults with Alzheimer's disease and related dementias. Health Aff 2014;33(4):633-41.
613. Paraprofessional Healthcare Institute (PHI). Direct Care Workers in the United States: Key Facts. 2021 Available at: https://phinational.org/resource/direct-care-workers-in-the-united-states-key-facts-2/. Accessed October 22, 2021.
614. Trinkoff AM, Han K, Storr CL, Lerner N, Johantgen M, Gartrell K. Turnover, staffing, skill mix, and resident outcomes in a national ample of US nursing homes. J Nurs Adm 2013;43(12): 630-6.
615. U.S. Bureau of Labor Statistics. Occupational Outlook Handbook - Healthcare. Available at: https://www.bls.gov/ooh/healthcare/home-health-aides-and-personal-care-aides.htm. Accessed December 18, 2021.
616. U.S. Bureau of Labor Statistics. Occupational Outlook Handbook - Building and Grounds cleaning. Available at: https://www.bls.gov/ooh/building-and-grounds-cleaning/janitors-and-building-cleaners.htm. Accessed December 18, 2021.
617. U.S. Bureau of Labor Statistics. Occupational Outlook Handbook - Retail Sales Workers. Available at: https://www.bls.gov/ooh/sales/retail-sales-workers.htm. Accessed December 18, 2021.
618. Paraprofessional Healthcare Institute (PHI). Workplace Injuries and the Direct Care Workforce. Available at: https://phinational.org/resource/workplace-injuries-direct-care-workforce. Accessed October 21, 2021.
619. White EM, Wetle TF, Reddy A, Baier RR. Front-line nursing home staff experiences during the COVID-19 pandemic. J Am Med Dir Assoc 2021;22(1):199-203. Erratum in: J Am Med Dir Assoc 2021;22(5):1123.
620. Jones K, Mantey J, Washer L, Meddings J, Patel PK, Montoya A, et al. When planning meets reality: COVID-19 interpandemic survey of Michigan Nursing Homes. Am J Infect Control. 2021;49(11):1343-9.
621. Paraprofessional Healthcare Institute (PHI). We Surveyed Our Stakeholders on COVID-19. Here's What We Learned. Available at: https://phinational.org/we-surveyed-our-stakeholders-on-covid-19-heres-what-we-learned/. Accessed October 21, 2021.
622. Palacios-Ceña D, Fernández-Peña R, Ortega-López A, Fernández-Feito A, Bautista-Villaécija O, Rodrigo-Pedrosa O, et al. Long-term care facilities and nursing homes during the first wave of the COVID-19 pandemic: A scoping review of the perspectives of professionals, families and residents. Int J Environ Res Public Health. 2021;18(19):10099.
623. Paraprofessional Healthcare Institute (PHI). Understanding the Direct Care Workforce: Key Facts and FAQs. Available at: https://phinational.org/policy-research/key-facts-faq. Accessed October 21, 2021.
624. Rowe JW, Berkman L, Fried T, Fulmer J, Jackson M, Naylor W, et al. 2016. Preparing for Better Health and Health Care for an Aging Population: A Vital Direction for Health and Health Care. NAM Perspectives. Discussion Paper, National Academy of Medicine, Washington, DC.
625. Spetz J, Stone RI, Chapman SA, Bryant N. Home and community-based workforce for patients with serious illness requires support to meet growing needs. Health Aff (Millwood) 2019;38(6):902-9.
626. Winters A, Block L, Maxey H, Medlock C, Ruane K, Hockenberry S. State Strategies for Sector Growth and Retention for the Direct Care Health Workforce. 2021 Washington, DC: National Governors Association Center for Best Practices. Available at: https://www.nga.org/wp-content/uploads/2021/10/NGA_SectorGrowth-DirectCare_report.pdf. Accessed October 21, 2021.
627. Liu JL, Hlavka JP, Hillestad R, Mattke S. Assessing the Preparedness of the U.S. Health Care System Infrastructure for an Alzheimer's Treatment. Santa Monica, CA: RAND Corporation, 2017. Available at: https://www.rand.org/pubs/research_reports/RR2272.html. Accessed on October 21, 2021.
628. Tai-Seale M, McGuire TG, Zhang W. Time allocation in primary care office visits. Health Serv Res 2007;42(5):1871-94.
629. Jacobson M, Thunell J, Zissimopoulos J. Cognitive assessment at Medicare's annual wellness visit in fee-for-service and medicare advantage plans. Health Aff (Millwood) 2020;39(11): 1935-42.
630. Warshaw GA, Bragg EJ. The essential components of quality geriatric care. Generations. 2016;40(1):28-37.
631. Burke G, Orlowski G. Training to serve people with dementia: is our health care system ready? Available at: https://www.justiceinaging.org/wp-content/uploads/2015/08/Training-to-serve-people-with-dementia-Alz1_Final.pdf. Accessed October 24, 2021.
632. American Public Health Asociation. Strengthening the dementia care workforce: A public health priority. Available at: https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2021/01/13/strengthening-the-dementia-care-workforce. Accessed Ddecember 19, 2021.
633. Vespa J, Medina L, Armstrong DM. Demographic Turning Points for the United States: Population Projections for 2020 to 2060. Current Population Reports. 2020 P25-1144, U.S. Census Bureau, Washington, DC, 2020.
634. Gaps in the Dementia Care Workforce: Research Update and Data Needs. Committee on Population (CPOP) Semi-Annual Meeting, May 23, 2019. Available at: https://www.nia.nih.gov/sites/default/files/2019-11/Seminar-Gaps-Dementia-Workforce-Final-508.pdf. Accessed October 24, 2021.
635. The Gerontological Society of America. The GSA KAER Toolkit for Primary Care Teams: Supporting Conversations about Brain Health, Timely Detection of Cognitive Impairment, and Accurate Diagnosis of Dementia. Fall 2020 Edition. Available at: https://www.geron.org/images/gsa/Marketing/KAER/GSA_KAER-Toolkit_2020_Final.pdf. Accessed October 22, 2021.
636. Goldfarb D, Allen AM, Nisson LE, Petitti DB, Saner D, Langford C, et al. Design and development of a community-based, interdisciplinary, collaborative dementia care program. Am J Geriatr Psychiatry 2021;S1064-7481(21)00523-6.
637. Ty D, McDermott M, for the Alliance to Improve Dementia Care and Milken Institute. Building Workforce Capacity to Improve Detection and Diagnosis of Dementia. May 10, 2021. Available at: https://milkeninstitute.org/reports/building-dementia-workforce-capacity. Accessed November 19, 2021.
638. Geddes MR, O'Connell ME, Fisk JD, Gauthier S, Camicioli R, Ismail Z. Alzheimer Society of Canada Task Force on Dementia Care Best Practices for COVID-19. Remote cognitive and behavioral assessment: Report of the Alzheimer Society of Canada Task Force on dementia care best practices for COVID-19. Alzheimers Dement 2020;12(1):e12111.
639. Yi JS, Pittman CA, Price CL, Nieman CL, Oh ES. Telemedicine and dementia care: a systematic review of barriers and facilitators. J Am Med Dir Assoc 2021;22(7):1396-1402.
640. Guarnieri B, Maestri M, Cucchiara F, Lo Gerfo A, Schirru A, Arnaldi D, et al. Multicenter study on sleep and circadian alterations as objective markers of mild cognitive impairment and Alzheimer's disease reveals sex differences. J Alzheimers Dis. 2020;78(4):1707-19.
641. Muurling M, de Boer C, Kozak R, Religa D, Koychev I, Verheij H, et al. RADAR-AD Consortium: Remote monitoring technologies in Alzheimer's disease: design of the RADAR-AD study. Alzheimers Res Ther. 2021;13(1):89.

642. Mueller KD, Van Hulle CA, Koscik RL, Jonaitis E, Peters CC, Betthauser TJ, et al. Amyloid beta associations with connected speech in cognitively unimpaired adults. Alzheimers Dement (Amst). 2021;13(1):e12203.
643. Dumitrascu OM, Koronyo-Hamaoui M. Retinal vessel changes in cerebrovascular disease. Curr Opin Neurol. 2020;33(1):87-92.
644. Hurd MD, Martorell P, Delavande A, Mullen KJ, Langa KM. Monetary costs of dementia in the United States. N Engl J Med 2013;368:1326-34.
645. Unpublished data from the 2018 Medicare Current Beneficiary Survey (MCBS), analyzed by the Alzheimer's Association. October 2020.
646. Yang Z, Zhang K, Lin PJ, Clevenger C, Atherly A. A longitudinal analysis of the lifetime cost of dementia. Health Serv Res 2012;47(4):1660-78.
647. Murman DL, Chen Q, Powell MC, Kuo SB, Bradley CJ, Colenda CC. The incremental direct costs associated with behavioral symptoms in AD. Neurology 2022;59:1721-9.
648. Fishman P, Coe NB, White L, Crane PK, Park S, Ingraham B, et al. Cost of dementia in Medicare Managed Care: A systematic literature review. Am J Manag Care 2019;25:e247-53.
649. White L, Fishman P, Basu A, Crane PK, Larson EB, Coe NB. Medicare expenditures attributable to dementia. Health Services Res 2019;54(4):773-81.
650. Yang Z, Levey A. Gender differences: A lifetime analysis of the economic burden of Alzheimer's disease. Women Health Iss 2015;25(5):436-40.
651. Hudomiet P, Hurd MD, Rohwedder S. The relationship between lifetime out-of-pocket medical expenditures, dementia and socioeconomic status in the U.S. J Econ Ageing 2019;14: 100181.
652. Dwibedi N, Findley AP, Wiener C, Shen C, Sambamoorthi U. Alzheimer disease and related disorders and out-of-pocket health care spending and burden among elderly Medicare beneficiaries. Medical Care 2018;56:240-6.
653. Kelley AS, McGarry K, Gorges R, Skinner JS. The burden of health care costs for patients with dementia in the last 5 years of life. Ann Intern Med 2015;163:729-36.
654. Leniz J, Yi D, Yorganci E, Williamson LE, Suji T, Cripps R, et al. Exploring costs, cost components, and associated factors among people with dementia approaching the end of life: A systematic review. Alzheimers Dement (NY) 2021;7(1):e12198.
655. Rudolph JL, Zanin NM, Jones RN, Marcantonio ER, Fong TG, Yang FM, et al. Hospitalization in community-dwelling persons with Alzheimer's disease: Frequency and causes. J Am Geriatr Soc 2010;58(8):1542-8.
656. Landon BE, Keating NL, Onnela JP, Zaslavsky AM, Christakis NA, O'Malley AJ. Patient-sharing networks of physicians and health care utilization and spending among Medicare beneficiaries. JAMA Intern Med 2018;178:66-73.
657. U.S. Centers for Medicare & Medicaid Services. State Level Chronic Conditions Table: Prevalence, Medicare Utilization and Spending, 2007-2018. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main.html. Accessed December 18, 2021.
658. Cairns C, Kang K, Santo L. National Hospital Ambulatory Medical Care Survey: 2018 Emergency Department Summary Tables. Available from: https://www.cdc.gov/nchs/data/nhamcs/web_tables/2018_ed_web_tables-508.pdf. Accessed December 14, 2021.
659. Medicare. Glossary. Medicare: The Official U.S. Government Site for Medicare. Available at: https://www.medicare.gov/glossary/a. Accessed December 18, 2021.
660. Davis-Ajami ML, Lu ZK, Wu J. Exploring the home healthcare workforce in Alzheimer's disease and related dementias: Utilization and cost outcomes in US community dwelling older adults. Arch Gerontol Geriat 2022;98;104536.
661. Reschovsky JD, Hadley J, O'Malley J, Landon BE. Geographic variations in the cost of treating condition-specific episodes of care among Medicare patients. Health Services Res 2014;49(Part 1):32-51.
662. Leibson CL, Hall Lon K, Ransom JE, Roberts RO, Hass SL, Duhig AM, et al. Direct medical costs and source of cost differences across the spectrum of cognitive decline: A population-based study. Alzheimers Dement 2015;11(8):917-32.
663. Suehs BT, Davis CD, Alvir J, van Amerongen D, Patel NC, Joshi AV, et al. The clinical and economic burden of newly diagnosed Alzheimer's disease in a Medicare Advantage population. Am J Alzheimers Dis Other Dement 2013;28(4):384-92.
664. Lin P-J, Zhong Y, Fillit HM, Chen E, Neumann PJ. Medicare expenditures of individuals with Alzheimer's disease and related dementias or mild cognitive impairment before and after diagnosis. J Am Geriatr Soc 2016;64:1549-57.
665. Geldmacher DS, Kirson NY, Birnbaum HG, Eapen S, Kantor E, Cummings AK, et al. Pre-diagnosis excess acute care costs in Alzheimer's patients among a U.S. Medicaid population. Appl Health Econ Health Policy 2013;11(4):407-13.
666. Zhu CW, Cosentino S, Ornstein K, Gu Y, Scarmeas N, Andrews H, et al. Medicare utilization and expenditures around incident dementia in a multiethnic cohort. J Gerontol A Biol Sci Med Sci 2015;70(11):1448-53.
667. Kirson NY, Desai U, Ristovska L, Cummings AKG, Birnbaum HG, Ye W, et al. Assessing the economic burden of Alzheimer's disease patients first diagnosed by specialists. BMC Geriatrics 2016;16:138.
668. Aigbogun MS, Stellhorn R, Hartry A, Baker RA, Fillit H. Treatment patterns and burden of behavioral disturbances in patients with dementia in the United States: A claims database analysis. BMC Neurology 2019;19:33.
669. Harris-Kojetin L, Sengupta M, Lendon JP, Rome V, Valverde R, Caffrey C. Long-term care providers and services users in the United States, 2015–2016. National Center for Health Statistics. Vital Health Stat 2019;3(43).
670. Lendon JP, Singh P. Adult Day Services Center Participant Characteristics: United States, 2018. NCHS Data Brief No. 411, September 2021. Available at: https://www.cdc.gov/nchs/data/databriefs/db411.pdf. Accessed December 21, 2021.
671. Rome V, Penn Lendon J, Harris-Kojetin L. Differences in characteristics of adult day services centers by level of medical service provision. National Center for Health Statistics 2020;3(45):1-28.
672. Caffrey C, Sengupta M, Melekin A. Residential care community resident characteristics: United States, 2018. NCHS Data Brief, No. 404, September 2021.
673. Sengupta M, Caffrey C. 2020. Characteristics of residential care communities by percentage of resident population diagnosed with dementia: United States, 2016. Natl Health Stat Report 2020;148:1-8.
674. Caffrey C, Sengupta M. Variation in residential care community resident characteristics, by size of community: United States, 2016. NCHS Data Brief, no 299. Hyattsville, MD: National Center for Health Statistics. 2018.
675. Caffrey C, Harris-Kojetin L, Rome V, Sengupta M. Variation in operating characteristics of residential care communities by size of community: United States, 2014. NCHS Data Brief, No. 222. November 2015.
676. U.S. Centers for Medicare & Medicaid Services. Nursing Home Data Compendium 2015 Edition. Available at: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandComplianc/Downloads/nursinghomedatacompendium_508-2015.pdf. Accessed December 18, 2021.
677. Colelo KJ. Who pays for long-term services and supports? Congressional Research Service, In Focus, IF10343. August 5, 2021. Available at: https://crsreports.congress.gov/. Accessed November 22, 2021.
678. Eiken S, Sredl K, Burwell B, Amos A. Medicaid Expenditures for Long-Term Services and Supports in FY 2016. IAP Medicaid Innovation Accelerator Program. IBM Watson. May 2018. Available at: https://www.medicaid.gov/sites/default/files/2019-12/ltssexpenditures2016.pdf. Accessed December 18, 2021.

679. Murray C, Tourtellotte A, Lipson D, Wysocki A. Medicaid Long Term Services and Supports Annual Expenditures Report: Federal Fiscal Years 2017 and 2018. Chicago, IL: Mathematica, January 7, 2021.
680. Bynum J. Characteristics, Costs, and Health Service Use for Medicare Beneficiaries with a Dementia Diagnosis: Report 1: Medicare Current Beneficiary Survey. Unpublished; provided under contract with the Alzheimer's Association. Lebanon, N.H.: Dartmouth Institute for Health Policy and Clinical Care, Center for Health Policy Research, January 2009.
681. Clarkson P, Davies L, Jasper R, Loynes N, Challis D. Home Support in Dementia (HoSt-D) Programme Management Group. A systematic review of the economic evidence for home support interventions in dementia. Value in Health 2017;20:1198-209.
682. Nickel F, Barth J, Kolominsky-Rabas PL. Health economic evaluations of non-pharmacological interventions for persons with dementia and their informal caregivers: A systematic review. BMC Geriatrics 2018;18:69.
683. Callahan CM, Arling G, Tu W, Rosenman MB, Counsell SR, Stump TE, et al. Transitions in care among older adults with and without dementia. J Am Geriatr Soc 2012;60(5):813-20.
684. Gozalo P, Teno JM, Mitchell SL, Skinner J, Bynum J, Tyler D, et al. End-of-life transitions among nursing home residents with cognitive issues. N Engl J Med 2011;365(13):1212-21.
685. Teno JM, Mitchell SL, Skinner J, Kuo S, Fisher E, Intrator O, et al. Churning: The association between health care transitions and feeding tube insertion for nursing home residents with advanced cognitive impairment. J Palliat Med 2009;12(4):359-62.
686. Genworth. Genworth Cost of Care Survey 2020, Summary and Methodology. Genworth Financial, Inc. https://pro.genworth.com/riiproweb/productinfo/pdf/131168.pdf. December 2, 2020. Accessed December 18, 2021.
687. Koma W, Neuman T, Jacobson G, Smith K. Medicare beneficiaries' financial security before the coronavirus pandemic. Issue Brief. Kaiser Family Foundation. www.kff.org/medicare/issue-brief/medicare-beneficiaries-financial-security-before-the-coronavirus-pandemic/. Accessed on December 18, 2021.
688. U.S. Centers for Medicare & Medicaid Services. Your Medicare Coverage. Long-Term Care. Available at: https://www.medicare.gov/coverage/long-term-care.html. Accessed December 18, 2021.
689. Centers for Medicare and Medicaid Services. Skilled nursing facility (SNF) care. https://www.medicare.gov/coverage/skilled-nursing-facility-snf-care. Accessed December 18, 2021.
690. Centers for Medicare and Medicaid Services. What Are Long-Term Care Hospitals? CMS Product No. 11347. https://www.medicare.gov/Pubs/pdf/11347-Long-Term-Care-Hospitals.pdf. Revised June 2019. Accessed December 18, 2021.
691. Centers for Medicare and Medicaid Services. Original Medicare (Part A and B) Eligibility and Enrollment. https://www.cms.gov/Medicare/Eligibility-and-Enrollment/OrigMedicarePartABEligEnrol. Last Modified July 8, 2020. Accessed December 18, 2021.
692. Freed M, Damico A, Neuman T. A Dozen Facts About Medicare Advantage in 2020. Kaiser Family Foundation. April 20, 2020. https://www.kff.org/medicare/issue-brief/a-dozen-facts-about-medicare-advantage-in-2020/. Accessed December 18, 2021.
693. Centers for Medicare and Medicaid Services. How Do Medicare Advantage Plans Work? https://www.medicare.gov/sign-up-change-plans/types-of-medicare-health-plans/medicare-advantage-plans/how-do-medicare-advantage-plans-work. Accessed December 18, 2021.
694. Centers for Medicare and Medicaid Services. What's Medicare? What's Medicaid? CMS Product No. 11306. https://www.medicare.gov/Pubs/pdf/11306-Medicare-Medicaid.pdf. Accessed December 18, 2021.
695. U.S. Department of Health and Human Services. What is Long-Term Care Insurance? Available at: http://longtermcare.gov/costs-how-to-pay/what-is-long-term-care-insurance/. Accessed December 18, 2021.
696. National Association of Insurance Commissioners and the Center for Insurance Policy and Research. The State of Long-Term Care Insurance: The Market, Challenges and Future Innovations. CIPR Study Series 2016-1. May 2016.
697. Reaves EL, Musumeci M. Medicaid and Long-Term Services and Supports: A Primer. Menlo Park, Calif.: Kaiser Commission on Medicaid and the Uninsured, Henry J. Kaiser Family Foundation; December 2015. Publication # 8617-02.
698. House Bill 1087, 66th Legislature, 2019 Regular Session. Long-Term Services and Supports Trust Program. Available at: http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Session%20Laws/House/1087-S2.SL.pdf#page=1. Accessed December 18, 2021.
699. Centers for Medicare and Medicaid Services. Medicare and hospice benefits: Getting Started. Care and support for people who are terminally ill. CMS Product No. 11361. Revised March 2020. Available at www.medicare.gov/Pubs/pdf/11361-Medicare-Hospice-Getting-Started.pdf. Accessed December 18, 2021.
700. Gozalo P, Plotzke M, Mor V, Miller SC, Teno JM. Changes in Medicare costs with the growth of hospice care in nursing homes. N Engl J Med 2015;372:1823-31.
701. U.S. Centers for Medicare & Medicaid Services. Post-Acute Care and Hospice Provider Data 2017. Available at: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/PAC2017. Accessed December 18, 2021.
702. De Vleminck A, Morrison RS, Meier DE, Aldridge MD. Hospice care for patients with dementia in the United States: A longitudinal cohort study. J Am Med Dir Assoc 2018;19:633-8.
703. Russell D, Diamond EL, Lauder B, Digham RR, Dowding DW, Peng TR, et al. Frequency and risk factors for live discharge from hospice. J Am Geriatr Soc. 2017;65:1726-32.
704. U.S. Department of Health and Human Services, Centers for Medicare and Medicaid Services. 42 CFR Part 418 [CMS-1754-F] RIN 0938-AU41. Medicare Program; FY 2022 Hospice Wage Index and Payment Rate, Hospice Conditions of ParticipationUpdates, Hospice and Home Health Quality Reporting Program Requirements Update. Federal Register 2021;86(147):42528-606.
705. Taylor DH, Jr., Bhavsar NA, Bull JH, Kassner CT, Olson A, Boucher NA. Will changes in Medicare payment rates alter hospice's cost-saving ability? J Palliat Med 2018;21:645-51.
706. Miller SC, Lima JC, Looze J, Mitchell SL. Dying in U.S. nursing homes with advanced dementia: How does health care use differ for residents with, versus without, end-of-life Medicare skilled nursing facility care? J Palliat Med 2012;15:43-50.
707. Miller SC, Gozalo P, Mor V. Hospice enrollment and hospitalization of dying nursing home patients. Am J Med 2001;11(1):38-44.
708. Kiely DK, Givens JL, Shaffer ML, Teno JM, Mitchell SL. Hospice use and outcomes in nursing home residents with advanced dementia. J Am Geriatr Soc 2010;58(12):2284-91.
709. Teno JM, Gozalo PL, Bynum JP, Leland NE, Miller SC, Morden NE, et al. Change in end-of-life care for Medicare beneficiaries: Site of death, place of care, and health care transitions in 2000, 2005, and 2009. JAMA 2013;309(5):470-7.
710. Shega JW, Hougham GW, Stocking CB, Cox-Hayley D, Sachs GA. Patients dying with dementia: Experience at the end of life and impact of hospice care. J Pain Symptom Manage 2008;35(5):499-507.
711. Miller SC, Lima JC, Orna I, Martin E, Bull J. Hanson LC. Specialty palliative care consultations for nursing home residents with dementia. J Pain Symptom Manage. 2017;54:9-16.
712. Palmer MK, Jacobson M, Enguidanos S. Advance care planning for Medicare beneficiaries increased substantially, but prevalence remained low. Health Aff. 2021;40:613-621.
713. Bynum JPW, Meara E, Chang C-H, Rhoads JM. Our Parents, Ourselves: Health Care for an Aging Population. A Report of the Dartmouth Atlas Project. The Dartmouth Institute for Health Policy & Clinical Practice; 2016.

714. Teno JM, Meltzer DO, Mitchell SL, Fulton AT, Gozalo P, Mor V. Type of attending physician influenced feeding tube insertions for hospitalized elderly people with severe dementia. Health Aff 2014;33(4):675-82.
715. Mitchell SL, Mor V, Gozalo PL, Servadio JL, Teno JM. Tube feeding in U.S. nursing home residents with advanced dementia, 2000-2014. JAMA 2016;316(7):769-70.
716. Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2020 on CDC WONDER Online Database, released in 2021. Data are from the Multiple Cause of Death Files, 1999-2020, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Available at https://wonder.cdc.gov/ucd-icd10.html. Accessed December 30, 2021.
717. Park S, Chen J. Racial and ethnic patterns and differences in health care expenditures among Medicare beneficiaries with and without cognitive deficits or Alzheimer's disease and related dementias. BMC Geriatrics 2020;20:482.
718. Gilligan AM, Malone DC, Warholak TL, Armstrong EP. Health disparities in cost of care in patients with Alzheimer's disease: An analysis across 4 state Medicaid populations. Am J Alzheimers Dis Other Dement 2013;28(1):84-92.
719. Lin P-J, Zhong Y, Fillit HM, Cohen JT, Neumann PJ. Hospitalizations for ambulatory care sensitive conditions and unplanned readmissions among Medicare beneficiaries with Alzheimer's disease. Alzheimers Dement 2017;13(10):1174-8.
720. Healthy People 2020. Available at: https://www.healthypeople.gov/2020/data-search/Search-the-Data#objid=4159. Accessed December 18, 2021.
721. Davydow DS, Zibin K, Katon WJ, Pontone GM, Chwastiak L, Langa KM, et al. Neuropsychiatric disorders and potentially preventable hospitalizations in a prospective cohort study of older Americans. J Gen Intern Med 2014;29(10):1362-71.
722. Guterman EL, Allen IE, Josephson SA, Merrilees JJ, Dulaney S, Chiong W, et al. Association between caregiver depression and emergency department use among patients with dementia. JAMA Neurol 2019;76:1166-73.
723. Patel A, Parikh R, Howell EH, Hsich E, Landers SH, Gorodeski EZ. Mini-Cog performance: Novel marker of post discharge risk among patients hospitalized for heart failure. Circ Heart Fail 2015;8(1):8-16.
724. Lin PJ, Fillit HM, Cohen JT, Neumann PJ. Potentially avoidable hospitalizations among Medicare beneficiaries with Alzheimer's disease and related disorders. Alzheimers Dement 2013;9(1):30-8.
725. MacNeil-Vroomen JL, Nagurney JM, Allore HG. Comorbid conditions and emergency department treat and release utilization in multimorbid persons with cognitive impairment. Am J Emerg Med 2020;38(1):127-31.
726. Feng Z, Coots LA, Kaganova Y, Wiener JM. Hospital and ED use among Medicare beneficiaries with dementia varies by setting and proximity to death. Health Aff 2014;33(4):683-90.
727. White EM, Kosar CM, Rahman M, Mor V. Trends in hospitals and skilled nursing facilities sharing medical providers. Health Affairs 2020;39(8):1312-20.
728. U.S. Centers for Medicare & Medicaid Services. COVID-19 Nursing Home Data. Available at: https://data.cms.gov/covid-19/covid-19-nursing-home-data. Accessed December 19, 2021.
729. Centers for Medicare & Medicaid Services. Preliminary Medicare COVID-19 Data Snapshot. Medicare Claims and Encounter Data: January 1, 2020 to August 21, 2021, Received by September 17, 2021. Available at: https://www.cms.gov/files/document/medicare-covid-19-data-snapshot-fact-sheet.pdf. Accessed January 9, 2022.
730. Lamont H, Samson LW, Zuckerman R, Dey J, Oliveira I, Tarazi W. The Impact of COVID-19 on Medicare Beneficiaries with Dementia (Issue Brief). Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services. April 6, 2021.
731. Wang Q, Davis PB, Gurney ME, Xu R. COVID-19 and dementia: Analyses of risk, disparity, and outcomes from electronic health records in the US. Alzheimers Dement 2021;17(8):1297-1306.
732. Centers for Medicare & Medicaid Services. The Impact of COVID-19 on Medicare Beneficiaries in Nursing Homes. Available at: https://www.cms.gov/files/document/medicare-covid-19-nursing-home-analysis.pdf. Accessed January 9, 2022.
733. Cubanski J, Neuman T. FAQs on Medicare Financing and Trust Fund Solvency. Kaiser Family Foundation, March 16, 2021. https://www.kff.org/medicare/issue-brief/faqs-on-medicare-financing-and-trust-fund-solvency/. Accessed January 9, 2022.
734. Alzheimer's Association. Changing the Trajectory of Alzheimer's Disease: How a Treatment by 2025 Saves Lives and Dollars. Available at: https://www.alz.org/help-support/resources/publications/trajectory_report. Accessed December 18, 2021.
735. Zissimopoulos J, Crimmins E, St. Clair P. The value of delaying Alzheimer's disease onset. Forum Health Econ Policy. 2014;18(1):25-39.
736. Alzheimer's Association. 2018 Alzheimer's Disease Facts and Figures. Alzheimers Dement 2018;14(3):408-11.
737. Mattke S, Hanson M. Expected wait times for access to a disease-modifying Alzheimer's treatment in the United States. Alzheimer's Dement. 2021;1-4.
738. Alzheimer's Association. Mild cognitive impairment (MCI). Available at: https://www.alz.org/alzheimers-dementia/what-is-dementia/related_conditions/mild-cognitive-impairment. Accessed February 3, 2022.
739. Administration for Community Living. 2020 Profile of Older Americans. May 2021. Accessed Feb 8, 2022. Available at https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2020ProfileOlderAmericans.Final_.pdf.
740. Mayo Clinic. Mild cognitive impairment (MCI): Symptoms and causes. Available at: https://www.mayoclinic.org/diseases-conditions/mild-cognitive-impairment/symptoms-causes/syc-20354578. Accessed February 3, 2022.
741. Petersen RC, Caracciolo B, Brayne C, Gauthier S, Jelic V, Fratiglioni L. Mild cognitive impairment: A concept in evolution. J Intern Med 2014;275(3):214-28.
742. Harvard Health Publishing. Staving off dementia when you have mild cognitive impairment. March 30, 2021. Available at: https://www.health.harvard.edu/staying-healthy/staving-off-dementia-when-you-have-mild-cognitive-impairment. Accessed February 3, 2021.
743. Mayo Clinic. Mild cognitive impairment (MCI): Diagnosis. Available at: https://www.mayoclinic.org/diseases-conditions/mild-cognitive-impairment/diagnosis-treatment/drc-20354583. Accessed February 3, 2022.
744. Roberts JS, Karlawish JH, Uhlmann WR, Petersen RC, Green RC. Mild cognitive impairment in clinical care: A survey of American Academy of Neurology members. Neurology 2010;75(5):425-31.
745. Angevaare MJ, Vonk JMJ, Bertola L, Zahodne L, Wei-Ming Watson C, Boehme A, et al. Predictors of incident mild cognitive impairment and its course in a diverse community-based population. Neurology 2022;98(1):e15-e26.
746. Jack CR, Jr., Bennett DA, Blennow K, Carrillo MC, Dunn B, Haeberlein SB, et al. NIA-AA Research Framework: Toward a biological definition of Alzheimer's disease. Alzheimers Dement 2018;14(4):535-62.
747. Teunissen CE, Verberk IMW, Thijssen EH, Vermunt L, Hansson O, Zetterberg H, et al. Blood-based biomarkers for Alzheimer's disease: Towards clinical implementation. Lancet Neurol 2021;S1474-4422(21)00361-6.
748. Cummings J, Lee G, Zhong K, Fonseca J, Taghva K. Alzheimer's disease drug development pipeline: 2021. Alzheimers Dement (NY) 2021;7(1):e12179.
749. Selkoe DJ. Treatments for Alzheimer's disease emerge. Science 2021;373(6555):624-6.
750. Alzheimer's Association. 2021 Alzheimer's disease facts and figures. Alzheimers Dement 2021;17(3):327-406.
751. National plan to address Alzheimer's disease: 2021 update. Available at: https://aspe.hhs.gov/reports/national-plan-2021-update. Accessed February 3, 2022.

752. Ad Council. Alzheimer's awareness. Available at: https://www.adcouncil.org/campaign/alzheimers-awareness. Accessed February 3, 2022.
753. Hopeful Together. About the campaign. Available at: https://hopefultogether.adcouncilkit.org/campaign/. Accessed February 3, 2022.
754. Centers for Medicare & Medicaid Services. Cognitive Assessment & Care Plans. Available at: https://www.cms.gov/cognitive. Accessed February 3, 2022.
755. Sabbagh MN, Boada M, Borson S, Chilukuri M, Dubois B, Ingram J, et al. Early detection of mild cognitive impairment (MCI) in primary care. J Prev Alzheimers Dis 2020;7(3):165-70.
756. Cordell CB, Borson S, Boustani M, Chodosh J, Reuben D, Verghese J, et al. Alzheimer's Association recommendations for operationalizing the detection of cognitive impairment during the Medicare Annual Wellness Visit in a primary care setting. Alzheimers Dement 2013;9(2):141-50.
757. Lee PR, Godfrey WB, Raza A, Xi R, Brea C, Smith Z, et al. Institutional experience on cognitive screening at the Medicare Annual Wellness Visit. Alzheimers Dement 2021;17(S10):e057470.
758. Milani SA, Marsiske M, Striley CW. Discriminative ability of Montreal Cognitive Assessment subtests and items in racial and ethnic minority groups. Alzheimer Dis Assoc Disord 2019;33(3):226-32.
759. Li J, Andy C, Mitchell S. Use of Medicare's New Reimbursement Codes for Cognitive Assessment and Care Planning, 2017-2018. JAMA Netw Open 2021;4(9):e2125725.
760. ACT on Alzheimer's. Screening and Diagnosing Diverse Populations. Available at: https://www.actonalz.org/screening-diverse-populations. Accessed February 3, 2022.
761. Milani SA, Marsiske M, Cottler LB, Chen X, Striley CW. Optimal cutoffs for the Montreal Cognitive Assessment vary by race and ethnicity. Alzheimers Dement (Amst) 2018;10:773-81.
762. Wright CB, DeRosa JT, Moon MP, Strobino K, DeCarli C, Cheung YK, et al. Race/ethnic disparities in mild cognitive impairment and dementia: The Northern Manhattan Study. J Alzheimers Dis 2021;80(3):1129-38.
763. Department of Health & Human Services, Centers for Medicare & Medicaid Services. LTSS Research: Cognitive Assessment Tools. December 15, 2017. Available at: https://www.cms.gov/Outreach-and-Education/American-Indian-Alaska-Native/AIAN/LTSS-TA-Center/pdf/Best-Practices-Dementia-Cognitive-Assessment-Tools.pdf. Accessed February 3, 2022.
764. Alzheimer's Association. 2017 Alzheimer's disease facts and figures. Available at: https://www.alz.org/media/images/2017-facts-and-figures.pdf. Accessed February 3, 2022.
765. Alzheimer's Association. 2021 Alzheimer's Association Research Fellowship (AARF): Innovative approaches to diagnosis of AD for non-specialty practice. Available at: https://www.alz.org/research/for_researchers/grants/funded-studies-details?FundedStudyID=2504. Accessed February 3, 2022.
766. Clinicaltrials.gov. Discovery of novel biomarkers that will lead to the early detection of Alzheimer's disease (BVB). Available at: https://clinicaltrials.gov/ct2/show/NCT03136679. Accessed February 3, 2022.
767. Clinicaltrials.gov. Rocky Mountain Alzheimer's Disease Center Longitudinal Biomarker and Clinical Phenotyping Study. Available at: https://clinicaltrials.gov/ct2/show/NCT02612376. Accessed February 3, 2022.
768. Clinicaltrials.gov. Multi-center development of a novel diagnostic test for Alzheimer's disease (DTAD). Available at: https://clinicaltrials.gov/ct2/show/NCT03560960. Accessed February 3, 2022.
769. Rhoads K, Isenberg N, Schrier A. UW Project ECHO-Dementia: Implementation of a virtual clinic and telementoring program to improve dementia diagnosis and treatment in rural and under-resourced primary care settings. Alzheimers Dement 2021;17 Suppl 8:e051217.
770. University of Washington Medicine Memory & Brain Wellness Center. Project ECHO® dementia. Available at: http://depts.washington.edu/mbwc/resources/echo. Accessed February 3, 2022.
771. UCLA Health. Alzheimer's and dementia care program. Fall 2021. Available at: https://www.uclahealth.org/dementia/workfiles/about-us/Newsletter-Fall-2021.pdf. Accessed February 4, 2022.
772. Watson JL, Ryan L, Silverberg N, Cahan V, Bernard MA. Obstacles and opportunities in Alzheimer's clinical trial recruitment. Health Aff (Millwood) 2014;33(4):574-9.
773. Carr SA, Davis R, Spencer D, Smart M, Hudson J, Freeman S, et al. Comparison of recruitment efforts targeted at primary care physicians versus the community at large for participation in Alzheimer disease clinical trials. Alzheimer Dis Assoc Disord 2010;24(2):165-70.
774. National Institute on Aging. Together We Make the Difference: National Strategy for Recruitment and Participation in Alzheimer's and Related Dementias Clinical Research. October 2018. Available at: https://www.nia.nih.gov/sites/default/files/2018-10/alzheimers-disease-recruitment-strategy-final.pdf. Accessed February 3. 2022.
775. Brookmeyer R, Gray S, Kawas C. Projections of Alzheimer's disease in the United States and the public health impact of delaying disease onset. Am J Public Health 1998;88:1337-42.
776. U.S. Department of Labor. Changes in Basic Minimum Wages in Non-Farm Employment Under State Law: Selected Years 1968 to 2021. Available at: https://www.dol.gov/agencies/whd/state/minimum-wage/history. Accessed December 18, 2021.

The Alzheimer's Association acknowledges the contributions of Joseph Gaugler, Ph.D., Bryan James, Ph.D., Tricia Johnson, Ph.D., Jessica Reimer, Ph.D., Michele Solis, Ph.D., and Jennifer Weuve, M.P.H., Sc.D., in the preparation of *2022 Alzheimer's Disease Facts and Figures*. Additional contributors include Rachel F. Buckley, Ph.D., and Timothy J. Hohman, Ph.D.

The Alzheimer's Association leads the way to end Alzheimer's and all other dementia — by accelerating global research, driving risk reduction and early detection, and maximizing quality care and support.

Our vision is a world without Alzheimer's and all other dementia.®

Alzheimer's Association
225 N. Michigan Ave., Fl. 17
Chicago, IL 60601-7633
800.272.3900
alz.org®

alzheimer's association®