JUNEAU COMMISSION ON AGING AGENDA

June 20, 2023 at 1:30 PM

Zoom Webinar

https://juneau.zoom.us/j/81491760970?pwd=bkFwWk42MllmazI0aFdMS3ArTG5qZz09

Or Call In: 1-253-215-8782

Meeting ID: 814 9176 0970 Passcode: 858248

A. CALL TO ORDER/ROLL CALL

B. APPROVAL OF AGENDA

C. APPROVAL OF MINUTES

1. **2023-05-23 Juneau Commission on Aging Minutes - Draft**

D. PUBLIC PARTICIPATION ON NON-AGENDA ITEMS

E. AGENDA TOPICS

2. **Monthly Meeting Time Discussion**
3. **JCOA Discussion - asking CBJ Employees to Support a Universal Building Code**
4. **Final Review of JCOA Annual Report to the Assembly Human Resources Committee**
5. **JCOA - Standing Agenda Topics - Main Projects/Subcommittee Updates**

A.) Housing for Seniors

B.) May Listening Sessions - Recap & Takeaways

C.) Improving Volunteer Database

D.) Creating Senior Fitness & Social Opportunities

E.) Southeast Regional Eldercare Coalition

F.) 2020 Senior Needs Survey - website link to full survey (Executive Summary included in packet)

F. ASSEMBLY LIAISON COMMENTS AND QUESTIONS

G. NEXT MEETING DATE

H. ADJOURNMENT

ADA accommodations available upon request: Please contact the Clerk's office 36 hours prior to any meeting so arrangements can be made for closed captioning or sign language interpreter services depending on the meeting format. The Clerk's office telephone number is 586-5278, TDD 586-5351, e-mail: city.clerk@juneau.gov.

JUNEAU COMMISSION ON AGING WORKSESSION MINUTES

May 23, 2023 at 10:30 AM

Zoom Webinar

https://juneau.zoom.us/j/81491760970?pwd=bkFwWk42MllmazI0aFdMS3ArTG5qZz09

Or Call In: 1-253-215-8782 Meeting ID: 814 9176 0970 Passcode: 858248

A. CALL TO ORDER/ROLL CALL

Chair Kane called the Juneau Commission on Aging Work session to order at 10:43 am.

Present: Emily Kane, Carol Ende, Deb Craig, Kathleen Samalon, Linda Kruger, Jennifer Garrison, Ann Stepetin

Absent: Sue Warner, Jenn Carson

B. APPROVAL OF AGENDA

Agenda approved.

C. AGENDA TOPICS

1. **Drafting JCOA Annual Report to the Assembly -** Emily suggested including 5 bragging points and 3 requests.

   The first request focuses on changing the building code, incrementally toward universal design. The second request is for a senior navigator that would be like a case manager or dispatcher to help people connect with appropriate services or information. The third request is a long-range project for a stand-alone senior center to support seniors. It is included as a tickler to garner support for a senior center, plant a seed and be responsive to what we heard at the Listening sessions. Think Zack Gordon Youth Center for seniors. Funding could come from CBJ, Tribal and other partners. Jennifer and Ann clarified about Title 6 and Title 3 funding. A small amount of Title 6 goes to Tlingit and Haida for senior lunches twice a month. This discussion will be continued.

   Emily also commented that Age-Friendly domain 5 “Respect and Social Inclusion” - including programs that promote ethnic and cultural diversity, as well as multigenerational interaction and dialogue didn’t receive any comments at the listening sessions. We might want to dig deeper into this topic.

   Linda will take the lead in compiling comments from the listening sessions, written and online questionnaires. The results will provide the foundation for the Age Friendly action plan.

   Emily requested that Deb’s additions be included as an attachment to #1.

   The discussion of Listening sessions continued with discussion of participants not knowing about seniors’ services available from ADRC and SAIL. Perhaps the JCOA can help them tell their story better. ADRC has focused on people with disabilities and not so much on seniors. Deb reminded us that one of the SREC positions is a navigator for seniors.

   Kathleen reeled us back to discussion on the report. She asked about past reports. None are available on the website. Emily said that they have been in the range of 1-1/2 pages. Kathleen questioned whether we should focus on achievements and not requests. She suggested that we could request to meet with the Committee of the Whole (COW) to discuss our requests and future foci.

   Emily will continue to work on the draft report and requested members send her suggestions. We will finalize the report at the June meeting. Kathleen reiterated the three requests - building code, senior navigator, and senior center. There was also some discussion about improving the JCOA website.

Deb will share the job descriptions for the SREC positions, including the navigator position. Deb and Linda will give a presentation on SREC at the June meeting.

D. COMMITTEE MEMBER & ASSEMBLY LIAISON COMMENTS & QUESTIONS

We would like to help increase awareness of ADRC senior services.

E. NEXT MEETING DATE

Tuesday, May 23, 2023 - JCOA/AARP Listening Session 4:30pm at Douglas Library

Tuesday, June 20, 2023 at 1:30pm via Zoom - Regular JCOA Meeting

F. ADJOURNMENT

There being no further business to come before the committee, meeting adjourned at 11:24am.

JUNEAU COMMISSION ON AGING FY22 ANNUAL REPORT to the CITY AND BOROUGH OF JUNEAU ASSEMBLY

TO: Greg Smith, Assembly Human Resources Committee Chair
FROM: Emily Kane, JCOA Chair
CC: JCOA Commissioners, including Assembly Liaison Michelle Hale

The Juneau Commission on Aging (JCOA) is proud to submit our FY2022 Annual Report to the City and Borough of Juneau (CBJ) Assembly. The JCOA appreciates the ongoing support from the Assembly in accomplishing our mutual goals to ensure the safety and wellbeing of our senior population, many of whom form an important source of volunteer support and whose pensions, retirement savings and social security checks contribute significantly to the CBJ economy. Notwithstanding minimal funding, the JCOA has been instrumental in improving the quality of life and opportunities for seniors in our community.

Our CBJ Resolution mandates that we "build a coalition among established groups and support programs working to address the needs of seniors," a goal we accomplished in 2022 (see item 1). Our duty to "collect facts and statistics, and make studies of the conditions and problems pertaining to the employment, health, financial security, social welfare, and other factors that bear upon the well-being of older Juneau-ites," is the center of our work via outreach (See item 5) and engagement in "support[ing] the Assembly's Economic Plan as it relates to the senior economy" (see items 2,3 & 4).

In the past year the nine members of JCOA focused on the top priorities of senior needs in our community based on data gathered during our 4th decennial survey (2019-2021), from Listening Sessions in partnership with our local AARP, and via our monthly meetings where we share information about local senior-focused services.

JCOA FY22 ACCOMPLISHMENTS

1) JCOA created the **Southeast Regional Eldercare Coalition (SREC)** in early 2022. SREC's mission is to bring eldercare providers together to problem solve mutual issues, share information and be a collaborative force for change. The JCOA then wrote a $2.5 million project grant funded by the Margaret A Cargill Philanthropies (October 2022) that will hire four dedicated positions to serve seniors: a program director, recruiter (housed with AKDOLWD), trainer, and navigator (housed with SAIL). The project will focus on workforce development of direct service providers (DSPs) for home health care and implement a two year pilot DSP wage supplementation to increase the hourly wages of DSPs in the SE region. The grant funds are projected to last for two years.

2) Through extensive national research and interviews with local developers, two housing position papers were created: one for developers, "Building Age Friendly Housing in Juneau," and another for CBJ employees, **"Can You Support Age Friendly Construction in Proactive Ways?"** These papers provide detailed examples of what can be done to support the creation of new housing with universal design. They are now being used as talking points in emails, discussions and presentations within the broader housing community to move the age-friendly discussion from theoretical to practical action items.

3) JCOA completed the work necessary for to receive recognition by AARP's national **"Network of Age-Friendly States and Communities."** Juneau is the second Alaskan community to qualify for this designation. Anchorage received the recognition in 2022. This is not just an honor, but a responsibility, and the JCOA will continue to partner with Juneau AARP Community Action Team (CAT) to increase the all-age friendliness of our community.

4) A subcommittee was established which focus is on **increasing opportunities for senior recreation, fitness and social connectedness**. The US Surgeon General recently warned that our elders are suffering from epidemic levels of boredom, loneliness and helplessness. We are committed to alleviating this plague.

5) JCOA and co-sponsor AARP facilitated three (3) **"Listening Sessions"** throughout the city to gather information from seniors about their perspective and needs in eight domains of livability. These sessions included presentation by CBJ staff (Ruth Kostik) on the four (4) major tax relief programs offered to seniors by the City and Borough of Juneau.

JCOA FUTURE GOALS

The purpose of the JCOA is to advise the Assembly on senior issues and to promote awareness of all aspects of life affecting our seniors, and the role of seniors in the social and economic life of CBJ. We take seriously our duty to "promote senior citizen participation in the planning and development of programs which benefit and enhance the health, safety, and welfare of senior citizens." More specifically, we ask the Assembly to give deliberate consideration to paving the way for three major missions which will require your support.

1. Distribute our position paper to all CBJ employees ("Can You Support Age Friendly Construction in Proactive Ways?") and urge them to do whatever they can in their role in city government to prioritize and implement the list of very specific requests, including "as was done to create accessory apartments, can a new program be created that would make grants available to seniors to help cover the cost of retrofitting a multi-story home with an elevator or other senior friendly requirements."

2. A full- service, appealing Senior Center was overwhelmingly the number one request from the AARP/JCOA Listening Sessions held at our downtown, Douglas and Mendenhall libraries in May 2023. JCOA requests Assembly support to explore the creation of multi-purpose senior center to provide community meals, offer art classes, movie and game nights. The Senior Center would diminish isolation and promote intellectual stimulation with lectures (World Affairs Council), as well as self-help information (modified exercise, improving vision, or stretching/yoga provided by our own local health care/eldercare providers). Senior specific positions and services could ultimately be located at a full-service senior center extending opportunities for semi-independent seniors beyond Mountain View, Riverview and the Pioneer Home.

3. JCOA, via the MACP SREC Grant, has created and will fund a "senior navigator" to facilitate matching seniors' needs with local resources. This position is intended to be housed with SAIL (the current ADRC in Juneau) and help seniors coordinate among the array of senior services currently available (CBJ, JCOA, CCS, SAIL, Bartlett Regional Hospital, Teal Street, ORCA, Hospice and Home Care, Cornerstone, United Way, Chamber of Commerce, Rotary, Lions Club, Alaska Commission on Aging, etc.) This position will be funded for the two-year grant term and, if successful, the JCOA will look to the CBJ to assist in continuing to support this crucial position.

Respectfully,
Juneau Commission on Aging

Emily Kane, JCOA Chair and Medical Provider
Linda Kruger, JCOA Secretary, SREC, AARP
Deb Craig, JCOA Treasurer, SREC Secretary
Kathleen Samalon, Housing Subcommittee Co-Chair
Carol Ende, Housing Subcommittee Co-Chair
Sue Warner, Fitness/Recreation Subcommittee Chair
Jennifer Carson, Bartlett Regional Hospital, SREC
Jennifer Garrison, Eldercare Provider
Ann Stepetin, Eldercare coordinator for Central Council of the Indian Tribes of Alaska

Juneau Commission on Aging

Building Age Friendly Housing in Juneau

What if all homes in Juneau could be suitable for anyone regardless of a person's age or physical ability?

What if a person who wants to live within their community regardless of his or her age or physical ability, could do just that?

These are questions being asked by governing agencies and individuals who are working towards moving Juneau to be a well-designed, age-friendly community that allows elders to continue to spend their retirement years and money in Juneau. Your support is necessary to make this goal a reality.

The fact is that nearly 30% of the Juneau population is over 55. Aging in place is a personal objective of most Juneau Elders as indicated by the 2020 Senior Survey. Unfortunately, their homes generally built in the 70's a& 80's, did not take into consideration an owner's probable future limitations. Going forward, we hope you see the importance of building new residences of all types that integrate age-friendly features into the design, regardless of the age of the targeted buyer today.

These universal design features are not onerous. They already are recommendations made by the Fair Housing Act Design and Construction Requirements, International Building Code, and the AARP Home Fit Guide and other entities.

Could you voluntarily adopt these choices as construction best practices in all new housing construction as well as consider building smaller houses specifically for those Juneau residents who want and still can live independently?

Basically, we are just asking that all new housing and remodels be user-friendly for everybody, regardless of their age.

When designing new residences …

1. Apartment & condo units that are single story within a multi-story building
2. Homes have an accessible living space including master bedroom/bath + laundry on at least one floor
3. Doorways (interior/exterior) that are at least 36” wide or made that wide by installing swing-away or swing-clear hinges to make use of entire doorway opening
4. Elevators in multi-family buildings of 3 floors or more
5. One bathroom with a walk-in shower, a built-in bench seat and grab-bars
6. Phone jacks in the master bedroom and kitchen
7. Zero step entrances/ramps into the building and zero step thresholds
8. Electrical outlets (above 18”) and light switches and thermostats (below 48”)
9. Pocket doors where practical in small spaces

When choosing features, select options …

Entrances and Exits

- Exterior lightening at all entrances with sensors
- Doors have lever-style handles

Kitchen

- Cabinetry is easy to access with pull-out cabinetry
- Suitable lighting over sink, stove, and other work area
- Easy to grasp D-shaped pulls and handles
- Stove and cooktop controls are near the front
- Area where a person can work while seated

Steps and Stairways

- Stairway lights can be turned off and off at both the top and bottom of the stairs
- Non-slip surface on steps
- Handrails on both sides of stairs

Living Room and Bedroom

- Light switches are rocker-style and installed between 36” and 44” from the floor
- Easy access to electrical and phone outlet
- Closets have interior lights and adjustable rods and shelves
- Room for the bed to place in a location that allows for easy access to the bathroom

Bathroom

- Raised or high-profile “comfort” toilet
- Easy to use lever handles for sink, bathtub, and shower faucets
- Walls are reinforced with blocking so grab bars can be installed in the bathtub, shower and adjacent to the toilet
- Shower has a no-step entry and seating
- The shower features a hand-held or adjustable showerhead

There is a new variety of creative housing options to consider

It is recognized that Juneau does have land availability issues that impacts the type of housing that can profitably be constructed. Today, however, there are evolving housing types that could diversify options for Elders beyond what is currently available, the house/condo/apartment complexes. Consider the possibilities.

- Tiny Homes
- Village Model
- Cottage Communities
- Accessory Dwelling Units
- Multigenerational Living Concept

Links for additional information

- 2020 Juneau Senior Survey https://juneau.org/clerk/boards-committees/jcoa
- Fair Housing Act Design Manual: https://www.huduser.gov/portal/publications/destech/fairhousing.html
- The Americans with Disabilities Act (ADA): https://www.ada.gov/
- AARP HomeFit Guide: https://www.aarp.org/livable-communities/housing/info-2020/homefit-guide.html
- National Association of Home Builders Certified Aging-in-Place Secialist (CAPS): https://www.nahb.org/Education%20and%20Events/Education/Designations/Certified%20Aging-in-Place%20Specialist%20CAPS
- Example of Tiny House Cottage Community: https://tinyhousetalk.com/tiny-cottage-community-in-bend-oregon/
- Example of the Multigenerational Living Concept: https://seniorhousingnews.com/2021/05/05/bill-thomas-colleagues-unveil-kallimos-communities-multigenerational-living-concept/
- Universal Design: http://universaldesign.com/what-is-ud/
- AARP Network of Age-Friendly States and Communities: https://www.aarp.org/livable-communities/network-age-friendly-communities/

Ask this question *"What kind of housing do you imagine needing and wanting for yourself as you move towards Elderhood?"* Whether your preference is an age friendly house/condo/apartment or one of the newer housing models based on smaller size and larger community, there will be plenty of grateful people that will want to live in what you build.

Contact: City Clerk's Office city.clerk@juneau.gov 907-586-5278

Juneau Commission on Aging

Can You Support Age Friendly Construction in Proactive Ways?

What if all homes in Juneau could be suitable for anyone regardless of a person's age or physical ability?

What if a person who wants to live within their community regardless of his or her age or physical ability, could do just that?

These are questions being asked by other municipalities that, like Juneau, are also members of the AARP Network of Age-Friendly States and Communities. CBJ needs to work towards moving the city to a well-designed, age-friendly community with housing that allows elders to continue to spend their retirement years and money in Juneau. Your support is necessary to make this goal a reality.

The fact is that nearly 30% of the Juneau population is over 55. Aging in place is a personal objective of most Juneau Elders as indicated by the CBJ 2020 Senior Survey. Unfortunately, their homes generally were not built in the past taking into consideration an owner's probable future limitations.

That needs to change and CBJ can help. Whatever your role in government, look for ways to facilitate age friendly housing, homes that are attractive to 1st time buyers as well as those residents who need to downsize … universal design. Ask this question *"What kind of housing do you imagine needing and wanting for your well-being as you move towards Elderhood?"*

Requirements to make this happen are not onerous. To make this point here are examples of what the Juneau Commission on Aging is asking developers to voluntarily adopt as construction best practices in all new housing construction. The list was created from recommendations included in the Fair Housing Act Design and Construction Requirements, AARP HomeFit Guide, and other sources. Basically, we are just asking that all new housing and remodels be user-friendly for everybody, regardless of their age.

Promote universal construction design

1. Apartment & condo units that are single story within a multi-story building
2. Homes have an accessible living space including master bedroom/bath + laundry on at least one floor
3. Doorways (interior/exterior) that are at least 36” wide or made that wide by installing swing-away or swing-clear hinges to make use of entire doorway opening
4. Elevators in multi-family buildings of 3 floors or more
5. One bathroom with a walk-in shower, a built-in bench seat and grab-bars

6. Phone jacks in the master bedroom and kitchen
7. Zero step entrances/ramps into the building and zero step thresholds
8. Electrical outlets (above 18”) and light switches and thermostats (below 48”)
9. Pocket doors where practical in small spaces

Encourage feature friendly selections

Entrances and Exits
- Exterior lightening at all entrances with sensors
- Doors have lever-style handles

Kitchen
- Cabinetry is easy to access with pull-out cabinetry
- Suitable lighting over sink, stove, and other work area
- Easy to grasp D-shaped pulls and handles
- Stove and cooktop controls are near the front
- Area where a person can work while seated

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- Stairway lights can be turned off and off at both the top and bottom of the stairs
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Living Room and Bedroom
- Light switches are rocker-style and installed between 36” and 44” from the floor
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Bathroom
- Raised or high-profile “comfort” toilet
- Easy to use lever handles for sink, bathtub, and shower faucets
- Walls are reinforced with blocking so grab bars can be installed in the bathtub, shower and adjacent to the toilet
- Shower has a no-step entry and seating
- The shower features a hand-held or adjustable showerhead

What could you do in your job role to increase age-friendly housing?

- Could the city codify any of the requests that we are asking developers to do as a best practice?
- Within your role at CBJ, we ask you to explore ways the city can incentivize developers to include these features.
- Could select Americans with Disabilities Act (ADA) and Fair Housing Act (FHA) recommendations be formally adopted by CBJ?
- Could the Planning Commission, Zoning Commission give credit/points to developers who demonstrate their willingness to help make Juneau an Age Friendly Community - such as including mini pocket exercise areas within their development, etc.?
- Could the city continue to refine current senior population numbers for Juneau to aid in better projections of senior housing needs, specifically how many senior housing units are required of each type?
- Could the Juneau Economic Development Council provide developers loans for senior specific housing? The support could be in the form of loans, or a guarantee to the bank of a portion of the loan, or interim financing for the construction loan.
- Could the city sponsor or work with local builders to develop the Certified Aging-in-Place Specialist (CAP) designation? This is National Association of Home Builders Certification.
- As was done to create accessory apartments, can a new program be created that would make grants available to seniors to help cover the cost of retrofitting a multi-story home with an elevator or other senior friendly requirements.
- Look for ways to encourage or approve the building of tiny homes and other small residential models suitable for elders. Possible examples include adjusting city code to not require streets but rather covered walkways. Could these walkways even be in a CBJ Right of Way? Could public water and sewer also be there and CBJ maintain the covered walkways instead of a street?
- Could the city land code be modified to allow developers to build affordable, small one-level homes on smaller lots than are currently permitted? Could parking requirements be reduced as often senior couples only have one car?

Be creative in supporting diversity in innovative housing options

It is recognized that Juneau does have land availability issues that impacts the type of housing that can be constructed profitably. Today, however, there are evolving housing types that could diversify options for Elders beyond what is currently available: house/condo/apartment complexes.

What is necessary for this to happen is CBJ supporting these new innovative approaches and removing obstacles to their development. Consider the possibilities.

- Tiny Homes
- Village Model
- Cottage Communities
- Accessory Dwelling Units
- Multigenerational Living Concept
- Etc.

Links for additional information

- 2020 Juneau Senior Survey https://juneau.org/clerk/boards-committees/jcoa
- Fair Housing Act Design Manual: https://www.huduser.gov/portal/publications/destech/fairhousing.html
- The Americans with Disabilities Act (ADA): https://www.ada.gov/
- AARP HomeFit Guide: https://www.aarp.org/livable-communities/housing/info-2020/homefit-guide.html
- National Association of Home Builders Certified Aging-in-Place Specialist (CAPS): https://www.nahb.org/Education%20and%20Events/Education/Designations/Certified%20Aging-in-Place%20Specialist%20CAPS
- Example of Tiny House Cottage Community: https://tinyhousetalk.com/tiny-cottage-community-in-bend-oregon/
- Example of the Multigenerational Living Concept: https://seniorhousingnews.com/2021/05/05/bill-thomas-colleagues-unveil-kallimos-communities-multigenerational-living-concept/
- Universal Design: http://universaldesign.com/what-is-ud/
- AARP Network of Age-Friendly States and Communities: https://www.aarp.org/livable-communities/network-age-friendly-communities/

Just as Juneau's developers will need to be creative and flexible to see how these types of age friendly housing can fit into the land they own, so does CBJ need to see how city practices can be changed to accommodate new housing models. Everybody wins.

Contact: City Clerk's Office city.clerk@juneau.gov 907-586-5278

HOUSING CONCERNS: Juneau Senior Survey 2020

April/2023

This document is simply extracts that mention housing from the 105-page Senior Survey (2020). Its purpose is to make it easier for JCOA commissioners and CBJ to understand and to continue to address what the community has told us about housing issues. The survey was provided to residents 55 & older.

Executive Summary Comments

Housing is the issue that has come up most frequently in this survey.
Providing alternative housing for seniors that want to downsize would free up family-size homes for young families in the community.
Homes age like people. Build homes now that will age in place along with their occupants.
Focus is on new independent housing needs, not on needs expressed for medical care housing options.
Want to downsize to smaller home
A few people already have built homes to accommodate aging in place with room for caregivers
Want to stay near family and in own home.
Housing and affordable housing – housing at all levels of the economic scale
Housing includes apartments, not just private residences
Availability of affordable assisted living housing, affordable independent senior housing homes

Introduction

Housing was the most mentioned topic in this survey and is a pivotal issue when making the decision to stay or leave Juneau. Availability of affordable assisted living housing, affordable independent senior housing, and services to help residents continue to live in their own homes were identified as the top senior priorities that need work in Juneau.

Of the 495 comments made, 108 of them mentioned housing as an issue. Common issues include the cost and lack of availability of assisted living facilities and physically accessible housing, the lack of a senior housing complex, the difficulty and cost of in-home care, and property taxes. Many of these comments stressed that housing is a pivotal issue when making the decision to stay or leave Juneau.

Affordable senior housing ranked lowest on a list – in terms of meeting current needs, with over 80 percent of respondents, indicating that this area could sue improvement or need a lot of work.

The increase in fees at the Pioneer Home was unanimously condemned. Respondents indicated they could not or would not be able to afford the fee increases and will have to find alternative housing and care elsewhere, more than likely outside of Alaska.

The greatest percent, 29 percent, anticipated a need for a more accessible/lower maintenance home, a need that could be met by adaptations to one's current home as opposed to living elsewhere. Although Juneau's senior population was not knowledgeable of many nationally growing alternative housing programs (Integrated Resident Communities, The Village to Village Network, etc.), the "Tiny Home" concept showed the most familiarity with 13 percent saying it would be a good fit in Juneau. Affordable senior independent housing was the top answer for Question 45 "What do you think Juneau residents aged 55 or older need that is not now adequately and/or readily available in Juneau?

Seventy-six percent of respondents now live in houses compared to 65 percent in 2010. This shift can perhaps be explained by the aging into the survey of homeowners who moved to Juneau and bought homes during a Juneau housing boom and now are aging in place in the Valley. 78% of respondents age 55-74 lived in homes.

The survey showed that 32 percent of respondents under 75 anticipate needing to make their houses more accessible and require less maintenance or they indicated a need to move to homes that meet those requirements.
Over 62 percent of respondents ages 75 older anticipate that they will need a different housing situation altogether. The most common answer, 29 percent, anticipated a need for a more accessible/lower maintenance home.

In the current survey, respondents were given a choice of impairments for which home modifications may be needed, including the choice of no disability. Mobility issues were the predominant concern, followed by hearing and vision impairment, with the percentage of respondents needing this adaptation increasing with age.

Does your current living situation need to be adapted to be made more accessible and safe features

Condos one level, affordable single level housing
Might buy a condo
Planning to build a retirement home with limited maintenance needed
We want to downsize, but cannot find a favorable condo to purchase
I am considering buying a condo here but they are so expensive for what you get. I also own a condo
Probably accessible low maintenance condo
Purchase condo or house elsewhere and may choose to leave Juneau and live there due to affordability
We would like to live in a new condo development
Availability of a nice condo to purchase.
Home was built to accommodate aging in place with room for caregivers
Independent living apartment

Financial grants and advice to help with accessibility issues like ramps and stairs
Ideally in a low maintenance home with elders, my peers and young people around interacting with the elders as part of their housing.
possibly ground level apartment versus on 2nd floor
No stairs. Now I have 17 in apartment
Have been making upgrades as necessary to make house more elder friendly
Senior living elsewhere in Alaska
Super insulated, low-maintenance, 200% renewable energy
Transitional housing that will meet my needs as I age
Urn for ashes
Built home with accessibility as priority
High toilets, walk-in shower, and grab bars
It will become difficult, too many stairs
Make downstairs livable in case can't traverse stairs.
More user-friendly kitchen and bathroom.
Most thing have been made accessible.
Need bus and CARE A VAN to come to Auk Nu Condos
Need chairlift outside home by stairs
Need more units with no stairs
STAIRS
Stairs are a concern.
Stairs are very difficult
The townhouse is on three levels and might become an issue.
We have already made some changes
We remodeled bathrooms, but our house has stairs.
We wish we'd put in space for ab elevator!
When we remodeled 20 years ago, we made the house accessible.

The question “Could use improvement” or “Needs a lot of work”

Affordable senior independent housing was the top answer
The topic of suitable and affordable housing was at the top of the priority list.
The increase in fees at the Pioneer Home was unanimously condemned with responses that highlighted the huge financial burden that came with this fee increase.

Do you Own, rent or Other?

While the majority of respondents, 84 percent overall, own their home, seniors in the oldest age cohort show a transition away from home ownership to rental
Compared to 2010 results, there is a shift in the last decade toward more home ownership and less rentals.
This further supports the idea that younger seniors are aging in place in the homes they purchased in the Valley when they first moved to Juneau.

If You Anticipate the Need to Live in a Different Housing Situation, What Type of Housing Situation Will You Need?

There is a significant difference in the needs of seniors 75 and over compared to younger seniors.
About 32 percent of respondents under 75 anticipate needing to make their houses more accessible and lower maintenance in the future and/or indicate a desire to move to homes that meet that need
The greatest percent, 29 percent, anticipated a need for a more accessible/lower maintenance home.
As this is a need that can be met by adaptations to one’s current home and does not indicate a need to “live elsewhere.”

New Approaches and Innovations in Senior Living Communities Are Being Developed. How Familiar Are You with the Programs Listed Below

Almost all respondents, 94 percent or more, have either not heard of or don’t know much about Integrated Resident Communities, the Green House Project, International Elder-Friendly communities, and the Village to Village Network.
More seniors have heard of Tiny Homes and Communities, but again, 85 percent of respondents don’t know or know very little about this option
Low income village with shopping center, bank hospital/clinic and rides is what we need for all the working people that live check to check
Granny Pods
Compounds for elderly that allow easy transition from independent apartment living to assisted living to a nursing home
Co-housing would be nice to have in Juneau

Cottage housing neighborhoods would work well here.

Small homes with common front yard grass, garden, benches.

Communal living communities

I am familiar with all of these but there are not funds nor enough interest in Juneau to pursue them.

Building a small home on existing property to allow family care.

Tiny homes or apartments to an existing home would allow seniors to remain on their own property and have family or friends give assistance living next door

Inter-generational Co-housing communities

Co-housing, that's what I really want. Like anchorage hass

Group housing

Dog friendly housing desperately needed with NO ARBITRARY LIMIT on size of dogs. My parents had to give up their beloved older dog when they moved into an assisted living situation due to health

Continuing Care Retirement Communities (CCRC)
I hope to stay in Juneau indefinitely if needed services and housing are available
I know that I cannot live in Juneau once I retire. It is not an affordable place and lacks sufficient aging housing
I could move like some of our friends have because of CBJs anti-senior attitude
Lack of affordable housing is a BIG problem

Must get Assisted Living Facility in Juneau & more Housing for Seniors without stairs
Would like to get a single story house for long term accessibility but don't think it's financially realistic
Affordable single level housing
Small, ranch-style single family homes
Independent housing designed to transition between large family home and apartment dwelling. Two master bedrooms with bath etc.
Need affordable senior housing
• Senior retirement complex with separate 1 or 2-bedroom apartments with dining facilities, exercise, hobby, and community areas
Tiny homes within walking distance of services
Tiny house community

How Well Are the Following Quality of Life Needs Met in Juneau for Seniors?

Affordable assisted living and affordable senior housing ranked lowest on the list, with over 80 percent of respondents indicating that these needs could use improvement or need a lot of work.

What Do You Think Juneau Residents Aged 55 Or Older Need That Is Not Now Adequately and/or Readily Available in Juneau?

Overall, all respondents agreed that the greatest unmet needs in Juneau are for affordable senior independent housing and more specialty medical care

Do you have any additional comments/thoughts/concerns you would like to share?

Housing was the most frequently addressed topic in this section. Of the 495 comments made, 108 of them mentioned housing as an issue

Common issues include the cost of and lack of availability in assisted living facilities and physically accessible housing, the lack of a senior housing complex, the difficulty and cost of in-home care, and property taxes.

Many of these comments stressed that housing is a pivotal issue when making the decision to stay or leave Juneau.

Affordable independent senior housing, and Services to help residents continue to live in their own homes got the most “Could use improvement” or “Needs a lot of work”

Having affordable housing that can accommodate the needs of seniors is absolutely essential if they are going to continue living in Juneau.

If you anticipate the need to live in a different housing situation, what type of housing situation will you need?

Don't want to think about it

Downsize to smaller home

Grave

Having a person who could help me with light tasks live in my home

Home care -- part time

Home was built to accommodate aging in place with room for caregivers

I am considering buying a condo here but they are so expensive for what you get

I 'anticipate' living in my own home until my last day.

I would need continuum of care with more assisted living, nursing 24 hours in home and possibly Pioneer Home.

I live in an accessible house built for aging in

Ideally in a low maintenance home with elders, my peers and young people around interacting with the elders as part of their housing.

If necessary - Lower 48 area closer to more medical care

Independent living apartment or move in with or closer to out-of-town family and friends

Independent living apartment, assisted Living, Pioneer Home
Independent/Assisted Progressive Care Facility
Might buy a condo
Affordable housing with no stairs
Move back to Anchorage when I retire
Move out of town; Juneau is too expensive
Possibly ground level apartment versus on 2nd floor
No stairs. Now I have 17 in apartment
Need to get where I have less maintenance
Out of town residential community
Outside of Juneau to be closer to medical specialists
Plan to die at home
Probably accessible low maintenance condo
Purchase condo or house
Senior living elsewhere in Alaska
Single family home
Single family residence
Small townhouse in valley
Something affordable - so leaving Juneau, most likely
Stay in my own home with intermittent caregiving
Transitional housing that will meet my needs as I age
Urn for ashes
We would like to live in a new condo development

Does your current living situation need to be adapted to be made more accessible and safe?

Apartment that will have a room for medical equipment
Grab bars for safety in the bathrooms
High toilets, walk-in shower, and grab bars
I have no disability now, but I'd like to get rid of the exterior steps.
I would like to see us get emergency pull cords for the apartments
Make downstairs livable in case can't traverse stairs.
More user-friendly kitchen and bathroom.
Need more units with no stairs
We wish we'd put in space for an elevator!

Please indicate which of the following you need but CANNOT find in Juneau

Affordable housing with NO STAIRS!
Advise on where/what to do for future housing

Affordable housing options

Introduction

Housing was the most mentioned topic in this survey and is a pivotal issue when making the decision to stay or leave Juneau. Availability of affordable assisted living housing, affordable independent senior housing, and services to help residents continue to live in their own homes were identified as the top senior priorities that need work in Juneau.

Of the 495 comments made, 108 of them mentioned housing as an issue. Common issues include the cost and lack of availability of assisted living facilities and physically accessible housing, the lack of a senior housing complex, the difficulty and cost of in-home care, and property taxes. Many of these comments stressed that housing is a pivotal issue when making the decision to stay or leave Juneau.

Affordable senior housing ranked lowest on a list – in terms of meeting current needs, with over 80 percent of respondents, indicating that this area could sue improvement or need a lot of work.

The increase in fees at the Pioneer Home was unanimously condemned. Respondents indicated they could not or would not be able to afford the fee increases and will have to find alternative housing and care elsewhere, more than likely outside of Alaska.

The greatest percent, 29 percent, anticipated a need for a more accessible/lower maintenance home, a need that could be met by adaptations to one's current home as opposed to living elsewhere. Although Juneau's senior population was not knowledgeable of many nationally growing alternative housing programs (Integrated Resident Communities, The Village to Village Network, etc.), the "Tiny Home" concept showed the most familiarity with 13 percent saying it would be a good fit in Juneau. Affordable senior independent housing was the top answer for Question 45 "What do you think Juneau residents aged 55 or older need that is not now adequately and/or readily available in Juneau?

Seventy-six percent of respondents now live in houses compared to 65 percent in 2010. This shift can perhaps be explained by the aging into the survey of homeowners who moved to Juneau and bought homes during a Juneau housing boom and now are aging in place in the Valley. 78% of respondents age 55-74 lived in homes.

The survey showed that 32 percent of respondents under 75 anticipate needing to make their houses more accessible and require less maintenance or they indicated a need to move to homes that meet those requirements.

Over 62 percent of respondents ages 75 older anticipate that they will need a different housing situation altogether. The most common answer, 29 percent, anticipated a need for a more accessible/lower maintenance home.

In the current survey, respondents were given a choice of impairments for which home modifications may be needed, including the choice of no disability. Mobility issues were the predominant concern, followed by hearing and vision impairment, with the percentage of respondents needing this adaptation increasing with age.

Does your current living situation need to be adapted to be made more accessible and with safe features

Condos one level, affordable single level housing
Might buy a condo
We want to downsize, but cannot find a favorable condo to purchase
I am considering buying a condo here but they are so expensive for what you get.
Probably accessible low maintenance condo
Purchase condo or house elsewhere and may choose to leave Juneau and live there due to affordability
We would like to live in a new condo development
Availability of a nice condo to purchase.
Home was built to accommodate aging in place with room for caregivers
Financial grants and advice to help with accessibility issues like ramps and stairs
Ideally in a low maintenance home with elders, my peers and young people around interacting with the elders as part of their housing.
Possibly ground level apartment versus on 2nd floor
No stairs. Now I have 17 in apartment
Have been making upgrades as necessary to make house more elder friendly
Senior living elsewhere in Alaska
Super insulated, low-maintenance, 200% renewable energy
Transitional housing that will meet my needs as I age
Urn for ashes
Built home with accessibility as priority
High toilets, walk-in shower, and grab bars
It will become difficult, too many stairs
Make downstairs livable in case can't traverse stairs.
More user-friendly kitchen and bathroom.
Most thing have been made accessible.
Need bus and CARE A VAN to come to Auk Nu Condos
Need chairlift outside home by stairs
Need more units with no stairs
STAIRS
Stairs are a concern.
Stairs are very difficult

The townhouse is on three levels and might become an issue.
We have already made some changes
We remodeled bathrooms, but our house has stairs.
We wish we'd put in space for ab elevator!
When we remodeled 20 years ago, we made the house accessible.

NEWS RELEASE 24-MAY-2023

Living in an almshouse boosts life expectancy, study finds

Living in an almshouse can boost the longevity of its residents by as much as two-and-a-half years compared to their counterparts in the general population, according to a new Bayes Business School report.

Reports and Proceedings
CITY UNIVERSITY LONDON

Living in an almshouse can boost the longevity of its residents by as much as two-and-a-half years compared to their counterparts in the general population, according to a new Bayes Business School report.

Almshouses provide affordable community housing for local people in housing need. They are generally designed around a courtyard to provide a 'community spirit', that is synonymous with the almshouse movement. They offer independent living but provide friendship and support when needed.

Analysing up to 100 years' worth of residents' records from various almshouses in England, the research suggests that living in these communities can reduce the negative impact on health and social wellbeing which is commonly experienced by the older population in lower socioeconomic groups, particularly those individuals who are living in isolation.

The results are very encouraging. They show that, for several of the almshouses included in the study, residents can expect to live as long as wealthier members of the general population despite coming from the most deprived quintile. This shows that the disparity in longevity and health outcomes could be mitigated even after reaching retirement age, provided a suitable social infrastructure can be put in place.

The report, authored by Professor Ben Rickayzen, Dr David Smith, Dr Anastasia Vikhanova and Alison Benzimra, concludes that almshouses could help the Government's aims to reduce inequalities in mortality, which are observed between socioeconomic groups, by reducing the social isolation experienced by many in the older population.

Titled 'Almshouse Longevity Study – Can living in an almshouse lead to a longer life?', the report's key findings are:

- Residents in almshouses in England receive a longevity boost relative to people of the same socioeconomic group from the wider population.
- The best-performing almshouses in the study so far have shown a longevity boost which increases life expectancy to that of a life in the second-highest socioeconomic quintile – a remarkable outcome.
- As an example, the authors estimate that a 73-year-old male entering an almshouse such as The Charterhouse today would receive a longevity boost of 2.4 years (an extra 15% of future lifetime at the point of joining) compared to his peers from the same socioeconomic group, and 0.7 years when compared to an average 73-year-old from the general population.
- This longevity boost could be due to both the strong sense of community and social belonging within almshouses which lead to better physical and mental health. Enhanced wellbeing helps to mitigate loneliness which is endemic in older age groups.

Professor Ben Rickayzen, Professor of Actuarial Science at Bayes Business School, said:

“It is well known that, on average, the lower a person’s socioeconomic status, the lower their life expectancy. However, intriguingly, our research has found that this doesn’t have to be the case. We discovered that many almshouse residents receive a longevity boost when compared to their peers of the same socioeconomic status from the wider population.

“More research is needed to ascertain exactly what factors cause almshouse residents to have a longer life; however, we postulate that it is the sense of the community that is the most powerful ingredient. For example, a common theme within the almshouses included in the study is that they encourage residents to undertake social activities and responsibilities on behalf of their fellow residents. This is likely to increase their sense of belonging and give them a greater sense of purpose in their everyday lives while mitigating against social isolation.

“We would encourage the Government to invest in retirement communities, such as almshouses, which would be in keeping with their overarching levelling up agenda. While this agenda is commonly associated with enhancing equality on a regional basis, it is important that levelling up should also aim to combat health inequalities experienced by people from lower socioeconomic groups across the country. There is an opportunity to improve the Government’s levelling up agenda by incorporating the best features of communal living into their social housing policy. This should make a significant difference to the quality of life experienced by the older population across the UK.

“The findings from this research are important as they could offer solutions to the social care problems currently being experienced in the UK.”

Alison Benzimra, a co-author of the report and Head of Research at United St Saviour’s Charity, said:

“Many almshouse trustees and staff members anecdotally believe that almshouse living is beneficial for residents. The results from this study demonstrate that the community spirit provided by almshouses does in fact result in longer life expectancy. These findings are encouraging to those living and working in the almshouse community and provide the motivation to continue to explore what it is about almshouses’ physical design and support services that result in positive outcomes for older residents. This study strengthens the case that this historic form of housing is addressing the evolving needs of older people living in our modern-day society.”

Nick Phillips, CEO, The Almshouse Association, said:

“We are delighted to read this report. It is further evidence that the almshouse model – 1,000 years after its inception – seems to be adding something special to the lives of residents. There is a growing body of research that is suggesting this model of community housing seems to be right for the future. This must now beg the question, where are the philanthropists to lead this robust charity housing model into the next century?”

Susan Kay, Chief Executive of Dunhill Medical Trust, said:

“It’s been great to support this piece of work and to see it take its place in the wider body of work about the characteristics of age-friendly living spaces and supportive communities. A one-hundred-year life is now a realistic expectation and we need to build on this learning to create the homes and communities that will be so important for the health and wellbeing of us all.”

Nigel Hulme, a resident of the United St Saviour’s Charity almshouse, explained how much living in the almshouse has helped him in his later years:

“Moving to Hopton’s Gardens has been a godsend. To have a roof over my head has helped me to deal with my addiction issues, and having the support from the staff and my neighbours has made my recovery possible.”

Download the full report: Almshouse Longevity Study – Can living in an almshouse lead to a longer life?

The study was sponsored by the Dunhill Medical Trust and the Justham Trust and was supported by The Almshouse Association

Media Contact

Chris Lines
City University London
chris.lines@city.ac.uk
Office: 020-704-03062

Almshouse Longevity Study

CAN LIVING IN AN ALMSHOUSE LEAD TO A LONGER LIFE?

ALISON BENZIMRA
BEN RICKAYZEN
DAVID SMITH
ANASTASIA VIKHANOVA

BAYES
BUSINESS SCHOOL
CITY, UNIVERSITY OF LONDON

Bayes Business School (formerly Cass) is a leading global business school driven by world-class knowledge, innovative education, and a vibrant, diverse community. The School has been at the forefront of business education for more than 50 years, developing leaders who help businesses thrive through change and uncertainty. Bayes Business School is part of City, University of London.

Bayes Business School
City, University of London
106 Bunhill Row
London
EC1Y 8TZ

Note on the authors

Alison Benzimra is Head of Research and Influence at United St. Saviour's Charity. Alison has extensive experience in the ageing research field. She has gained valuable insight into the almshouse movement and works closely with older residents, staff and academic partners on a variety of projects.

Professor Ben Rickayzen is a Professor of Actuarial Science and was Head of the Faculty of Actuarial Science and Insurance at Bayes Business School (formerly Cass) from 2008 until 2022. His research interests include health and social care, with a particular emphasis on long-term care for the elderly. He has received ESRC, EPSRC and Institute and Faculty of Actuaries' grants to support his work. He began his career at the actuarial consultancy, Bacon & Woodrow (now part of Aon), and qualified as a Fellow of the Institute of Actuaries in 1990.

Dr David Smith is a Senior Lecturer in Actuarial Science in the Faculty of Actuarial Science and Insurance at Bayes Business School (formerly Cass) where he is Course Director of the BSc (Hons) Actuarial Science degree. He has carried out a great deal of research in developing new methods of projecting populations, as well as investigating new ways that the increasing costs of pensions and long-term care in the UK could be funded. He completed the Institute of Actuaries' examinations in 2002.

Dr Anastasia Vikhanova is an Early Career Researcher and a Teaching Fellow at the School of Biological and Behavioural Sciences, Queen Mary University of London. Her research interests focus on discrimination, mental health and cognitive biases in under-researched groups, such as migrants, refugees and ethnic minorities, as well as other socially disadvantaged groups.

Acknowledgements

Bayes Business School is very grateful to Dunhill Medical Trust and the Justham Trust for funding this project and to The Almshouse Association for their support. The research team are also grateful to the almshouses who contributed their records and for accommodating the research team in gaining access to the records. Additionally, the research team would like to convey their grateful thanks to the genealogy consultancy, Brother's Wish Genealogy Service, for all their help in completing former residents' records when required.

Foreword

The almshouse model was established a thousand years ago by philanthropists to provide a place of warmth, safety and sanctuary to those in need.

This community spirit is reflected in the architectural design of almshouses – often a three-sided quadrangle with doors and windows facing each other over a courtyard or community area - enabling a sense of community and companionship, yet still allowing independence. These design features are still commonly replicated in almshouses being built today.

A report published in 2017 investigating life expectancy in Whiteley Village shows that the average resident included in the study lives longer in the almshouse than the average citizen of England and Wales of the same age, gender and socio-economic grouping. We therefore commissioned a follow-up study to investigate whether this effect is seen across the almshouse movement more generally.

This report represents a review of decades, and in some cases, a century of data, considering the mortality rates of those who have lived in almshouses. It is clear that, in many cases, almshouse residents are receiving a similar type of longevity boost to that experienced by Whiteley Village residents. We should note, however, that the sample is limited to those charities who were able to supply sufficient data.

This latest research builds on past research pointing, perhaps, to the great value of companionship and strong micro-communities that this unique housing model embodies. I would like to suggest that, if we were to design a housing model which is the epitome of a good living environment today, it would include companionship, community and independent living in almshouses which are designed to underpin these values.

I thank all those who gave up their time to capture and share data, the very professional and dedicated team who carried out the data gathering, research and analysis and The Dunhill Medical Trust and the Justham Trust for funding the report. Special thanks to Ben, David, Alison and Anastasia for gallantly working to see this happen.

Nick Phillips

Chief Executive, The Almshouse Association

Contents

Executive Summary

There is currently a great deal of discussion about the continuing gap in both health and life expectancy between the different socio-economic status groups in the UK. Previous work in connection with a particular almshouse site within Whiteley Village has shown that it is possible to combat this inequality in people from lower socio-economic groups moving to Whiteley Village in their later lives. This report extends the work to investigate whether moving into other almshouses has a similar effect, i.e., in general, does living in an almshouse boost the life expectancy of someone from a low socio-economic group to that of a general member of the population?

Our results demonstrate that a longevity boost does indeed occur generally amongst almshouses, although we ascertain that the effect varies from almshouse to almshouse. In the best cases, we find that some almshouses in our study are replicating the previous result of increasing the life expectancy of a resident from that of the lowest-socio economic quintile to one enjoyed by a person in the second-highest quintile. The almshouses in this study are not homogenous and neither is the population from which their residents are drawn. It is therefore difficult to reach a single conclusion as to how much benefit an almshouse gives or what are the most important factors that contribute to any longevity boost. However, we do find that almshouses provide some ‘longevity boost’ to their residents.

We conclude by arguing that more research needs to be carried out into what it is about the experience of living in an almshouse that causes residents to receive a longevity boost, though we postulate that it is the sense of community that is the most powerful force. We would encourage the Government to invest in retirement communities such as almshouses, which would be in keeping with their levelling up agenda and should help with the social care problems that the UK is currently experiencing.

1. Introduction

In 2017, the research team at Bayes Business School, City University of London, was commissioned to conduct a study devoted to the 100th anniversary of Whiteley Village – one of the largest retirement communities in the UK (Mayhew, Rickayzen and Smith, 2017). Established in 1914 (with the first resident moving in 1917), Whiteley Village has almshouses within their village setting - a charitable purpose-built community, which provides accommodation for older people on low income. The interest in researching the residents was sparked by remarkable anecdotal evidence, which the researchers then confirmed empirically: it appeared that people living in this community get something that the researchers termed ‘a longevity boost’. In other words, the population of Whiteley Village had a higher life expectancy than an average citizen of England and Wales of the same age and gender. This result was particularly surprising given the common finding that people with lower socio-economic status (SES) tend to have a lower life expectancy than their counterparts in the general population (see, for example, Chetty et al., 2016; Meara, Richards & Cutler, 2008). This phenomenon is often assumed to be due to two of the major psychosocial determinants, poverty and inequality, which contribute to health inequality and high mortality rates both between and within countries (Marmot, 2005). However, Mayhew, Rickayzen and Smith (2017) discovered that the residents of Whiteley Village were receiving a longevity boost of up to 5 years.

These findings attracted a large amount of interest from researchers, practitioners, retirement communities and media outlets around the world. Nevertheless, two key questions remained: (1) is this longevity boost present in almshouse communities, other than Whiteley Village? If the answer is yes, then (2) what are the factors that increase life expectancy for those living in almshouse communities compared to people of a similar SES who are not living in such communities? There have been some recent developments regarding the answer to the latter question. For example, a large longitudinal study in China has recently discovered that older people who regularly engage in social activity see a boost of longevity, with the frequency of social engagement (e.g., those who took part in daily social activities) being associated with larger survival rates (Wang et al., 2023).

To date, in the UK, there has been a lack of literature looking into the benefits of living in retirement communities or villages, social support housing or any other types of community living. Previous research in Asia, Europe and the US generally found that lower SES can lead to social isolation (Dykstra & de Jong Gierveld, 1999; Röhr et al., 2022), with loneliness being a major contributor to lower life expectancy (Raymo & Wang, 2022). Likewise, older adults from particularly disadvantaged backgrounds experience a significant health decline with increased loneliness, which in turn impacts their activities of daily living (Shankar et al., 2017). This might suggest that loneliness creates a perpetuating cycle for older people from lower SES, where they initially lack both physical and social activity due to having few social interactions. Low levels of activity then lead to more physical as well as mental health problems (Gerino et al., 2017), which all contribute to reduced life expectancy. However, very few studies have assessed loneliness in older adults in residential care, and the results are inconclusive (Grenade & Boldy, 2008).

In this study we are interested in answering the first question, namely expanding on our findings in Whiteley Village to see if they also apply to other almshouses across England. To do this, we collected the data from 15 almshouses to investigate whether their residents have an increased life expectancy compared to the general population of England and Wales. In the following, we outline each almshouse's history, their eligibility criteria, payment structure, community and support structure and what they offer to the residents. It is important to explore the differences in structures of the almshouses included in the study since the characteristics of the different communities and the outline of their social support structure could provide further insights into why or how some almshouses benefit from certain longevity boosts. In other words, this may lead us to speculate on the second question about why almshouses may give this longevity boost, though we recognise this will only be conjecture.

2. Almshouses – history, eligibility and structures

2.1 History

Almshouses comprise charitable housing, the oldest form of social housing, often provided to local people in housing need, generally, but not limited to the older generation. The first ever almshouse was established in the UK in the 10th century, and since then they have often been affiliated with the church. Although modern almshouses are quite different, some continue with their traditions, and many have chapels within the residency. Currently, over 36,000 people live in almost 2,600 almshouses in the UK (The Almshouse Association, 2023). The sizes of these communities vary widely from a few dozen to several hundred residents. Over half of the independent almshouse charities across the UK (1,600) are represented by The Almshouse Association, which was established in 1946.

2.2 Eligibility criteria

Specific eligibility criteria vary from almshouse to almshouse, although the common criteria include being in need, be it financial, psychological or emotional. They may have little to no savings, limited financial means, in need of housing yet able to live independently or with minimal support whilst being in good health. Some almshouses offer accommodation only for one gender, whereas others are mixed gender and offer housing for couples or families too. More specific criteria for each charity are discussed below.

2.3 Payment structure and offerings

Residents of almshouses are usually not considered tenants and they do not pay rent per se. Instead, they are required to contribute something that is referred to as a weekly maintenance contribution. These may slightly vary from charity to charity, although most of these would be covered by full or partial housing benefit for residents who are retired; or the housing element of Universal Credit for residents under retirement age. Some almshouses also charge additional costs for council tax, bills, or internet, as well as any extracurricular activities that are provided within the community, such as day trips or holidays. There is often a considerable variation as to whether flats/houses come furnished or not, although charities usually refurbish properties before new residents move in.

2.4 Community and support structures

In return for their weekly contribution, residents enjoy a range of benefits while living in almshouses. Unlike other types of social housing, residents live in a supportive community, where events and activities are organized for them and by themselves. For example, many almshouses arrange coffee mornings, luncheons, celebrations, day trips, excursions, film and book clubs, gardening, fitness classes, bingo and sporting activities. In addition to this, Wardens may be present on the premises of the almshouses and provide some types of support for residents, for example, help with filling out forms or general health and well-being check-ups. In addition, medical support is available in some but not all almshouses. For example, some residencies have care homes located on the same site as the almshouses and/or have visiting GPs, whereas in other places residents are expected to arrange their own support if it is needed. Crucially, almshouses are provided to people who are able to live independently and are in overall good health at the point they arrive. However, there are many charities that accept people in poor health as long as they can live independently.

3. Almshouses that contributed to the study

In this project, we collected the data from 15 almshouses that primarily house people (men, women or couples) of state pension age. A survey was sent to all The Almshouse Association members enquiring whether they would like to participate and asking about the data held either in digital or hard copy form in respect of former residents. Due to concerns about collecting data related to current residents, the analysis was designed to be carried out on those residents who had died, meaning it was not necessary to obtain any information about current residents. As a result of the questionnaire, 15 almshouses agreed to allow the requisite data to be extracted from the former residents' records.

As with many old traditions and institutions, terminology has evolved over the years. Historically residents have been referred to as beneficiaries, brethren and pensioners to name a few. In this paper, we generally refer to people living in almshouses as residents.

We now provide a contextual narrative around each participating almshouse in turn.

3.1 Charterhouse

Originally built in the 14th century, Charterhouse became an almshouse in the 16th century following the death of its owner at that time, Thomas Sutton. Located in the heart of London, Charterhouse now houses over 40 Brothers (which is what the residents are known as). Up until 2018, only males were accepted. However, since then, females have been accepted too. To be eligible, an applicant needs to be over age 60, single, in need of financial, housing and social assistance, and need to have no significant financial debts. They also need to be able to live by themselves, have no serious significant physical or mental health problems (at the point of entry) and be keen to contribute to the Charterhouse community. In addition to private housing, there are 11 rooms available in their infirmary for those needing respite or longer-term care. A particular characteristic of the Charterhouse almshouse is that residents are allowed to come and go as they please, enjoying their life outside the walls of an almshouse. Many are often visited by their friends and family. However, they eat most of their meals with fellow residents in a communal dining hall, as well as enjoy

a range of activities provided by staff members, such as exercise sessions and a book club.

3.2 Chelsea Pensioners (Royal Hospital Chelsea)

The Royal Hospital Chelsea is located in central London. It was founded by King Charles II in 1682 specifically to house war veterans. Slightly different to traditional almshouses, the Royal Hospital provides a range of services and resources, from independent living to nursing care. It offers an on-site GP service, a team of carers and nurses in the care home, physiotherapy and occupational therapy services. Chelsea Pensioners (as the residents are usually known) also enjoy a range of internal and external services and activities, such as their own club and cafe, gardening club, trips to the cinema and art projects with external partners amongst others. In turn, their eligibility criteria are somewhat stricter than for other almshouses: at the point of arrival, an applicant needs to be a former non-commissioned officer or soldier of the British army who is over age 65 or of state pension age (whichever one is greater), free of financial obligations to support family or a partner, and physically able to live independently. Those who receive an Army Service Pension or War Disability Pension would be required to surrender it to cover the living costs, otherwise candidates must make a weekly financial contribution. There are currently over 280 army veterans living in the Royal Hospital, most of whom are men. Since 2009, the Royal Hospital also opened its doors to female applicants.

3.3 Durham Aged Mineworkers Homes Association

Durham Aged Mineworkers Homes Association (DAMHA) almshouses are among the most ‘recently’ established almshouses, as it was endowed in 1898, originally providing homes for applicants working in mines. Now, it is the largest almshouse trust in the UK providing 1,783 homes (bungalows) for over 2,299 people across 144 sites in 85 villages. The trust does not have a specific eligibility criterion, and anyone aged over 50 can apply; however, additional points are awarded to ex-mineworkers and their widows. Although priority is given to less physically active or to disabled people willing to live independently. There is no longer a requirement for applicants to have worked in the mining industry. Due to the substantial size of this almshouse charity, and because it attracts a wider mix of residents when compared with other

almshouses, fewer social activities are provided by the 28 members of DAMHA staff compared to the other almshouses, however, DAMHA still maintains a strong charity and community spirit. Nevertheless, residents are still involved in the community through focus groups, residents' forum, area meetings and gardening club membership. In the sheltered schemes, activities such as arts clubs, reading groups, computer skills, cards and bingo are available.

3.4 Hurst Consolidated Charity

Hurst Consolidated Charity is a relatively small community within Hurst Village, consisting of 20 apartments across three sites: two locations in St Nicholas Hurst and one in Twyford. The first site in Twyford was built in 1640 by Sir Richard Harrison of Hurst House and the first eight poor people entered in 1664. The eligibility criteria are (a) persons in need of affordable housing and (b) living in the parish of Hurst or adjacent parishes. The almshouse only expanded further in 1985 when four new apartments were added. In 1999, four further apartments originally built for nurses were created, and another apartment was built in 2019.

3.5 Morden College

Located in the suburban area of Southeast London, Morden College was established by a philanthropist Sir John Morden in 1695 to provide accommodation for poor older merchants who had lost their estates for various reasons. The original buildings were intended for 40 single or widowed men, but now Morden College comprises over 200 flats, 34 en-suite apartments and 60 en-suite bedrooms. Morden College is currently located across two sites: Blackheath in London and Beckenham in Kent. The former consists of Morden College – The Quadrangle (23 flats), Montague Graham Court (8 flats), Wells Court (20 flats), Alexander Court (30 flats), Graham Court (21 flats), and Peter Saunders Court (10 flats). In addition to almshouses, Morden College also has Cullum Welch Court, which is a residential care home comprising 60-beds with full-time nursing care. Aside from an extensive choice of accommodation, residents benefit from, amongst other things, a variety of clubs, social activities, trips, quiz nights, dinners, musical recitals, film shows and communal barbeque. Other facilities include a visiting GP, gardens, chapel, library, social club with bar facilities, cafes, pantries, traditional dining room where lunch is available for any resident and their guests. The Beckenham site consists of Ralph Perring Court, which offers 101 flats.

An eligible applicant/couple must be of retirement age, having worked in a managerial/leadership position in a trade, vocation or profession. They must also be in receipt of a UK state pension or be eligible for it, and be in financial and/or social need, such as loneliness or isolation.

3.6 Richard Watts Charity

The Richard Watts Charity was established following the death of its namesake in 1579, and supported the creation of The Poor Travellers House, which provided accommodation for six, as the name suggests, poor travellers. Now, the almshouse is spread across four sites in Rochester, providing in total 67 flats for single people. Watts Almshouses has 18 flats with an addition of two most recent houses: Donald Troup House, which has 15 flats and The Bungalows, which are ten easy-access properties. Hayward House consists of six flats in a two-story building. Reeves House provides residents with seven large flats. Lastly, St Catherine's Hospital offers 11 flats. Single people or couples who are no longer working are eligible to apply. They must be over age 65 and be residents within the ME1 or ME2 postcodes or be returning to be closer to their friends or family. Likewise, they should be in need of financial assistance and able to take care of themselves whilst having no serious health conditions upon entry. At the same time, the almshouse provides a 'home help service' for an additional charge of £12.50 per hour, whereby a helper can support residents with general house issues like cleaning and laundry, shopping and taking out rubbish. Those on a very low income might be eligible for this service free of charge. In addition to this, a Warden is available 24/7 at all flats for any emergencies, although they are not trained to provide medical or personal care.

3.7 Salisbury City Almshouse & Welfare Charities

The history of Salisbury City Almshouse dates to 1370, when Agnes Bottenham founded Trinity Hospital as an act of penance. Trinity Hospital, which back in the day was the only refuge for sick people in Salisbury, has now expanded into 11 almshouses with 190 sheltered flats (Brympton with 41 flats; Eyre House with eight flats; Hussey's Almshouse containing eight terraced houses and seven flats; Taylor's Almshouses with six flats; Hardy House with 16 double flats; Blechynden's Almshouses of three single flats; Trinity Hospital with 22 double flats; Brickett's Hospital containing seven houses; Gloucester House with 25 double flats; and Sarah

Hayter's Almshouses containing 11 double flats). In addition, there are 22 very sheltered studio flats, where 24-hour support from the Warden is provided. There is a slight variation in the eligibility criteria from house to house. All almshouses request that an applicant has been a resident in the Salisbury area for at least five years in their lifetime, is of retirement age and in need of sheltered housing from both a physical and financial perspective. The resident's total capital should not exceed £150,000 (or £180,000 for the very sheltered sites). Some almshouses, like Sarah Hayter's, only accept female applicants over the age of 50, whereas others also provide accommodation for young families in the area (not considered in this study). The majority of almshouses are, however, of mixed gender, including single men, single women and couples. As with other almshouses, residents enjoy their communal space and gardens, where a variety of activities are provided by the Warden or by other community members, including coffee mornings and other social events.

3.8 Sheppard Trust

Sheppard Trust almshouse, located in Holland Park in London, was first built in 1875 after being founded by Miss Elizabeth Sheppard in 1855 with the aim of providing low-cost housing for older women in receipt of small incomes. Renovated in 1999, Sheppard Trust now provides 29 flats (studios and one-bedroom apartments), although this is set to increase to 60 by 2024. The charity has modest eligibility criteria, and they accept female applicants of Christian faith aged 65 and over, in hardship or distress (e.g., enduring poor housing, receiving benefits and having no more than £75,000 in capital). They must also agree to the Statement of Community Values. In addition, it is expected that, upon entry, the applicants are able to live independently and are in generally good health. There are staff members available on site to provide advice, although no medical support is available. The Trust aims to create a sense of community and organises monthly events for their residents, such as tea parties, lunches and occasional daytrips. Each house is also equipped with a guest room to allow relatives and friends to visit. A weekly maintenance charge is usually fully covered by the resident's housing benefit, but residents are also expected to pay a small charge for hot water and heating.

3.9 St. Martin in the Fields Almshouse Charity

St. Martin in the Fields Almshouse Charity in North West London is a small modern almshouse, which consists of 19 unfurnished flats (16 one-bedroom and three studio flats). Established in 1597 by the parish of St. Martin in the Fields, the almshouse was originally providing accommodation to homeless, poor women who were over age 60 and spinsters, widows or divorced women of good character, residents in the City of Westminster. From 2008, the criteria were expanded to also allow applications from resident men and married couples over the age of 60. In addition, the charity provides accommodation to those employed in essential services, such as nurses and teachers working in Westminster, but such people are not considered in this project. As with other almshouses, at the point of entry, all applicants need to be able to live independently. Residents are offered a common room, where the Clerk and Warden often organise coffee mornings and other social activities for neighbours to socialise. Likewise, each flat is equipped with an emergency call system to assist residents with a 24-hour medical emergency support. From 2019, the Charity has also been working on the completion of a new block of 44 flats.

3.10 The Davenport Homes

The Davenport Homes is one of the youngest almshouses included in the study, having been formed in 1935. It operates 36 cottages and four flats located in Knowle, Solihull. The trust was founded by the director of the Davenport Brewery, Mr. Frank R. Davenport, to support current and former employees of the Davenport Brewery and their dependents, as well as poor people in need, retired nurses and other healthcare workers. The current eligibility criteria include anyone who is in need or requires housing regardless of whether they are single or a couple, but preference is given to those fulfilling the original criteria who can live independently, upon arrival. Residents enjoy a range of activities organized within the almshouse. The Resident's Liaison Officer coordinates coffee mornings, afternoon teas and other seasonal get togethers. The residents themselves are also active in their community and organize crafts and painting classes, bingo evenings and outings.

3.11 The Richmond Charities

The Richmond Charities has a long and diverse history. Started in 1600 by Sir George Wright, the almshouses have had several wealthy benefactors contributing property and land for building further almshouses. Currently, the charity owns and manages 145 almshouses over 12 estates in Richmond, Twickenham and Mortlake within the London Borough of Richmond upon Thames. These estates vary in size with the smallest providing three rooms, and the largest providing 50. These are as follows: Benn's Walk Almshouses (five one-bedroom bungalows); Bishop Duppa's Almshouses (ten one-bedroom cottages); Candler Almshouses (ten one-bedroom bungalows); Church Estate (10 one-bedroom cottage, 4 one-bedroom flats and four studios); Colstons' Almshouses (three one-bedroom bungalows); Hickey's Almshouses (50 one-bedroom cottages and bungalows and a guest room); Houblon's Almshouses (nine one-bedroom cottages); Juxon's Almshouses (three one-bedroom bungalows); Manning Place (three one-bedroom flats and six two-bedroom flats); Michel's Almshouses (17 one-bedroom cottages and a guest room); Queen Elizabeth's Almshouses (four one-bedroom cottages); and Wright's Almshouses (nine one-bedroom flats and a guest room). Despite being widespread, there is a strong sense of community present between the almshouse sites. Residents benefit from communal spaces, where members can exercise, do yoga, conduct their film clubs, quiz nights and other social events, which they are encouraged to organize for each other independently. Scheme Managers are present at every site and assist residents with independent living through regular visits and monitoring of their health and well-being, as well as each house being fitted with a careline connecting residents to emergency facilities. To be eligible to live in one of the twelve estates, applicants can be single or a couple, aged over 65, currently living in rented accommodation but be in need of housing. Applicants should have a low income, limited savings, be able to live independently and must be living within the London Borough of Richmond upon Thames for at least the last two years, although those who have family members living there can be considered in exceptional circumstances.

3.12 Trinity Hospital, West Retford

Trinity Hospital's history began in 1671, when John Darrel, a local doctor, left a will requesting that his estate be set up as an almshouse to support 15 poor bachelors or widowers of good character and at least 50 years old. Trinity Hospital still supports 15 men and has relatively strict eligibility criteria: only bachelors or widowers who are at least 50 years old can apply. They also must be of good character and have few savings and low income, as well as having a connection to Retford or the surrounding area. Additional criteria specify that a preference would be given to any descendants of John Darrel, the founder of the almshouse. As with other almshouses, applicants must be able to look after themselves, although staff members and the Matron are available on-site and do daily check-ups on residents' well-being and health. There is also an emergency call system available in each residence. Brethren (the official name of the occupants in the Trinity Hospital) are encouraged to live independently but within a supportive community, whereby a range of events is held throughout the year. For example, amongst other activities, residents can go on excursions, enjoy a biannual celebratory feast, communal barbeques and coffee mornings. Brethren are also encouraged to attend weekday and special services in a Hospital Chapel.

3.13 United St Saviour's Charity

United St Saviour's Charity currently manages two almshouses in London, one of which, Hopton Gardens Almshouses, was built in the 18th century and is located in central London, and the other is St Saviour's Court which is a much more modern residence built in 2006, located in Croydon. Across the two sites, United St Saviour's offers 75 homes, most of which are one-bedroom apartments, although a small number of two-bedroom apartments are also available. The charity is currently in the process of finishing their brand-new almshouse, Appley Blue, which will provide 51 one-bedroom and six two-bedroom flats. To be eligible, an applicant will usually be at least 65 years old, have lived in Southwark for at least three years, have low income, limited savings and be able to live independently. However, each apartment has an emergency cord system, which links residents with on-site managers or out-of-hours emergency services. Both almshouses provide communal space for residents to

socialise, and charity staff members also organise activities for all who wish to be involved.

3.14 Walthamstow and Chingford Almshouse Charity

Walthamstow and Chingford Almshouse Charity consists of five sets of almshouses located within Greater London. It was first established in 1527 by Sir George Monoux, before being joined by Mary Squires Almshouses endowed in 1795, Jane Sabina Collard Almshouses established in 1881, Chingford Almshouses built in 1859 and Colby Lodge that opened in March 2018. The charity now operates 62 apartments available for individuals or couples who are usually well over age 60, but younger people with disabilities are also housed there. The majority of the residents will have lived in Walthamstow or Chingford for at least a year prior to their application, or for five consecutive years at any time. Applicants are assessed based on their housing, social and financial need. Residents benefit from a friendly and supportive almshouse community, which staff encourage through social activities, daytrips, and almshouse events. Staff provide support by assisting residents with accessing benefits and social care when required. Residents and their families are encouraged to seek help from social services when residents are seen to be facing difficulties with maintaining their independence. Staff keep an eye on residents' wellbeing, and care services are provided to residents in their own homes. The charity also adapts the properties to meet residents' mobility needs where appropriate; for example, fitting grab rails, and ensuring that the properties have low level showers/wet rooms.

3.15 Yardley Great Trust

Yardley Great Trust was established at the end of the 14th century by John De Yardley who surrendered his land to provide housing for poor local people. Now, the trust operates six sheltered housing properties: (1) Acocks Green, which consists of 46 one-bedroom flats and one two-bedroom flat; (2) Coleshill consisting of 11 one-bedroom bungalows; (3) Shard End consisting of 30 one-bedroom bungalows; (4) Stechford with 66 one-bedroom flats; (5) two developments in Yardley, one with eight bungalows and two flats and the other one consisting of 30 one-bedroom flats and one two-bedroom bungalow with a residents' lounge; (6) and lastly Yardley Wood, which has ten flats. In total, Yardley Great Trust provides accommodation to over 200

people. The almshouses do not have very strict eligibility criteria. Yardley accepts applications from anyone who is aged 60 and over, although in some exceptional cases those over age 50 will be considered if they have a severe disability. Applications are prioritised based on applicants' circumstances; for example, those being threatened with homelessness will be given a priority compared to those who, for example, simply wish to move closer to their relatives or friends. As with other almshouses, staff members provide residents with a variety of activities to choose from depending on the houses, such as bingo, gardening club or dancing sessions, as well as day and weeklong trips. Almost all dwellings have an emergency service, which connects to the site manager during office hours, or to central control for out of hours emergencies.

4 Mortality analysis

As our data involves lives entering almshouses at different ages and in different calendar years, we need a method that allows the aggregation of all the lives for each almshouse and gender in one analysis. We carry this out by calculating the percentiles reached by the residents. For mortality data, actuaries use life tables that create model populations using the observed mortality rates. These life tables usually start with a radix of 100,000 lives at the initial age and the population then reduces in accordance with the observed mortality rates. Using these tables, we are able to calculate the ages by when a certain percentage of the population will have died or, equivalently, the ages when a certain percentage of the population is still alive.

In Figure 4.1 we show a survival curve for the England and Wales (E&W) male population starting with 100,000 lives at age 70 in the year 2020. We can see how the population reduces with age until the last life has died at age 111.

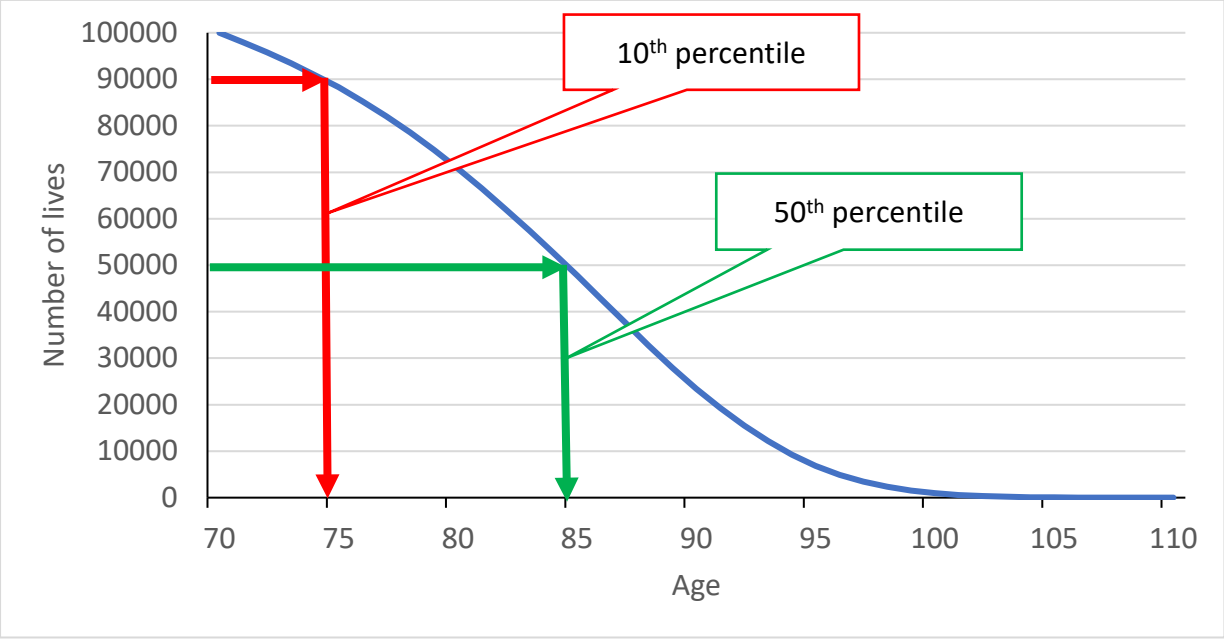

Fig 4.1 Survival curve for a 70 year old in 2020 (Source HMD, 2023)

In Figure 4.1 we have marked off two percentile points. The first one is the 10th percentile and this is the point at which 10% of the population have died and 90% are still alive. This age is calculated to be 74.3. The second percentile point shown is

the 50th percentile at which point half the population has died. This age is calculated to be 84.5. Therefore, if a person dies after this age, then they have lived longer than 50% of the population under consideration.

Using this percentile approach, our analysis involves the testing of four hypotheses for residents at almshouses for which we had sufficient data. These four hypotheses are:

1) That the average almshouse resident does not survive to the 40th percentile of the general population;
2) That the average almshouse resident survives to beyond the 40th percentile of the general population;
3) That the average almshouse resident does not survive to the 50th percentile of the general population;
4) That the average almshouse resident survives to beyond the 50th percentile of the general population.

To carry out a mortality comparison we need to compare the almshouse population with a suitable external population. We have selected the general England and Wales (E&W) population as being the most appropriate in terms of the location of the almshouse residents' previous residence, as many of the almshouses in this study take residents from around the country. The 50th percentile was therefore chosen as this compares the almshouse resident population to that of the E&W population, i.e., if half the residents are surviving to the 50th percentile then the residents of the almshouse are living similar lifespans to those of the general public.

However, as the residents come from the lower socio-economic groups, we would assume that they would have lower life expectancy than the population as a whole. We therefore also compared the residents to the 40th percentile as we saw this as an approximate target for the lives from this socio-economic group.

It should be borne in mind in the analysis which follows that there could be a selection effect as people are generally only able to enter an almshouse if they can live independently, at least to start with. One notable exception to this in our sample is the Royal Hospital Chelsea who act as both an almshouse and a hospice. This

was discussed in the contextual analysis and is revisited again when looking at the results.

We now describe our approach to comparing the mortality experience of our almshouse populations with the suitable general population.

4.1 Methodology

Due to data privacy concerns from many of the contributing almshouses, we agreed to only collect a minimal amount of data and only that which pertained to residents who had died, i.e., not current residents. The data we collected was:

- Name of resident (to enable data verification as detailed below);
- Date of birth;
- Gender;
- Date entered almshouse;
- Date left almshouse;
- Reason for leaving almshouse (death, withdrawal, ill-health, i.e., if the resident needed to move into end-of-life care).

We did not collect other data such as ethnicity or state of health at entry.

Since our data is restricted to deceased residents, our methodology is to consider each resident aged 60 and over who has died while living in the almshouse, moved into end-of-life care from the almshouse before death or who died within one year of leaving the almshouse. The idea here is to make sure that any longevity boost we record is due to living in an almshouse. For example, on the one hand, a resident who lives in an almshouse for three years, leaves and then lives for another 20 years in a different location cannot attribute their lifespan to living in the almshouse. On the other hand, a resident who lives in an almshouse for 12 years and then moves into an end-of-life care home due to failing health can be seen as having a lifespan based on their years in the almshouse. Once we have selected our qualifying residents, we then ascertain which percentile of the general population they reached upon death.

At this point, we should acknowledge the work of many volunteers at the various almshouses who have gathered the data and have given us access to their records. Due to the nature of the records, many were initially incomplete in terms of

information such as dates of birth or death. Thus, we used a genealogy consultancy, Brother's Wish Genealogy Service, to fill in the missing information where possible. However, inevitably, it was not possible to complete all the records, and some were excluded from our analysis. We also note that a couple of almshouses in this study have data sets which are currently incomplete but which we believe we can "clean" further and add to our results in the future.

Once the data was cleaned, we set about determining the ages to which different population percentiles survive by using the l_x values set out in the life tables for the E&W population. These provide information on how many males or females are expected to survive to exact age x in the general population. We are then able to use this data to create a life table for any resident based on the age and year that they entered the almshouse using a radix of 100,000 individuals at the age they entered the almshouse. We then used linear interpolation between integer ages to obtain approximate ages for each percentile to allow us to calculate the percentile at which each individual died.

For example, one of the residents in our Royal Hospital Chelsea dataset entered the almshouse in 1986 at the age of 68. Regarding this age at entry, we rounded down so that someone entering at age 68.5 would be classed as entering at age 68. We then measured the duration of their life after entering the almshouse and compared this duration of life to the life table for, in this case, a 68 year old in 1986. In our example, the resident lived for 4.54 years which meant that they survived to the 19th percentile of the life table. In other words, according to the England & Wales Life Table, 19% of people aged 68 in 1986 died before reaching the age of 72.54. This approach is carried out for all lives who met our criteria as detailed above.

We should note that we are not able to consider records where an individual joined an almshouse only recently as to do so would severely skew the results. For example, if a person enters an almshouse at the age of 65 in 2010, then they are only able to reach a maximum age of 76 by the end of 2021. Since our methodology can only consider lives that have died, for this life to be included in our data, they must have died by the age of 76 which means, by definition, they could only have reached a low percentile before death, thereby suppressing the results. We therefore only considered residents who would be able to reach the age of at least 90 by the

end of 2021 in order to give a fairly full range of percentiles that they could reach before death. While this approach still suppresses the results slightly, as some lives would still not be able to reach the highest percentiles, we wanted to include as much data as possible to reach firmer conclusions in our hypotheses tests. However, this does mean that an almshouse like DAMHA, which was only able to provide very recent data, will have its results skewed and hence will give a lower life expectancy than is actually the case.

Using this general concept, our testing procedure is as follows: for each almshouse and separately for each gender, we calculate all the percentiles for the lives which satisfy the above criteria. We are then able to look at the percentage of the almshouse residents who survived to the 40^{th} percentile and the percentage who survived to the 50^{th} percentile. These values can then be used as our test statistics for the hypothesis tests set out above. This will then allow a comparison between the percentage of almshouse residents who survive to these percentiles and the percentage surviving to those percentiles from the general population.

Our benchmark data on survival and life expectancy for males and females was extracted from the Human Mortality Database (HMD) for each year from 1917 to 2021 using data for the England and Wales civilian population (HMD, 2023).

In the next section we look at the results we obtained from the almshouses in the study.

5 Results

Using the methodology described in Section 4, we present our results below. We will set out our analysis for two almshouses in detail here and provide the analysis for the rest in the Appendix. However, we will summarise our findings for all the participating almshouses in the Conclusions. The two almshouses we will look at are Royal Hospital Chelsea and Charterhouse. We chose Royal Hospital Chelsea as it is the largest data set that we have and Charterhouse as it is the most historic and provides a contrast in outcomes to Royal Hospital Chelsea.

5.1 Royal Hospital Chelsea

Percentage of deaths from E&W population	10%	40%	50%	75%
Observed deaths from RHC	591	1,959	2,388	3,355
% of RHC population who have died	14.3%	47.3%	57.6%	80.9%

Total observed deaths = 4,145

Table 5.1: Observed number and proportion of male deaths by selected percentiles of E&W population

Table 5.1 shows the observed number of deaths by percentile of England & Wales (E&W) population. For example, for the 10% column we have observed 591 deaths. This number relates to the number of residents of Royal Hospital Chelsea who, when they died, were assigned a percentile lower than 10% when their age at death was compared to the standard E&W population for a person with the same age at entry. The value of 14.3% is derived by simply dividing the number of observed deaths, 591, by the total population, 4,145. The number 14.3% is therefore higher than we would expect if the population of Royal Hospital Chelsea had had the same future life expectancies as the standard E&W population. In other words, we would have expected to have seen 414 deaths at this point (i.e., 10% of our total population) not 591. For Royal Hospital Chelsea, it is not surprising that we are observing a higher percentage of deaths than 10% as Royal Hospital Chelsea operates with a dual function in both being a traditional almshouse and an end-of-life care provider (i.e., some residents will have decided to move into Royal Hospital Chelsea when in poor health to see out their remaining life with their peers).

Turning to the 40% column, we again see higher numbers of deaths than would be expected (47.3% rather than 40%), but this number obviously still includes those lives who came to Royal Hospital Chelsea already in poor health. At this point we

can test our first two hypothesis tests, i.e., do lives survive to the 40th percentile with statistical significance? And do lives live beyond the 40th percentile with statistical significance? For both of these tests we will use the same test statistic, which is the percentage of the Royal Hospital Chelsea population who have died before reaching this percentile, i.e., 47.3%.

Does the average Royal Chelsea Hospital resident survive to the 40th percentile?

To calculate this test statistic, we will assume that half of the population die before reaching the 40th percentile, i.e., that the real value that we should observe is 50%, and we will look for evidence that the actual real value is higher than 50%.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

where p = true underlying probability of an almshouse resident dying before the specified percentile.

This gives a test statistic of:

$$z = \frac{\hat{p} - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{n}}}$$

where $\hat{p}$ is the observed proportion of deaths in the almshouse at the specified percentile (47.3% for this particular test) and *n* is the size of the population of the sample, i.e., the total number of residents for this almshouse in the study (4145 for Royal Hospital Chelsea).

The test statistic can then be compared to the normal distribution.

$$z = \frac{0.473 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{4145}}} = -3.526$$

We can see that the test statistic is negative and so there is very little evidence that the residents of Royal Hospital Chelsea are not reaching the 40th percentile. This can easily be seen by the fact that 52.7% of the residents of Royal Hospital Chelsea

reached the 40th percentile so there is very little evidence that less than 50% of residents are surviving to this percentile.

Does the average resident of Royal Hospital Chelsea survive beyond the 40th percentile?

We have just noted that 52.7% of the residents of Royal Hospital Chelsea have survived beyond the 40th percentile, but is there statistical evidence that this is true? In other words, is the true underlying probability of surviving beyond the 40th percentile greater than 50% which is the same as asking whether the probability of dying before this point is less than 50%? We can test for this by changing the hypothesis test so that we are now looking for significant evidence that $p < 0.5$.

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

We have the same test statistic, as we are still looking at the 40th percentile, but for this second hypothesis test we are checking to see if the test statistic is less than -1.645. This is because we are trying to ensure that the conclusions we draw are statistically significant and observing a test statistic of less than -1.645 indicates that we would have only observed a proportion this far away from our assumed proportion by chance 5% of the time if the assumed proportion were true. As our test statistic is -3.526 we can clearly see that this is the case but we also want to calculate the p-value for this test, i.e., the probability that we are likely to have seen a probability this small (or smaller) by random chance if the true probability is 50%. This is calculated as:

$$\Pr(Z < -3.526) = 0.0002$$

So, the p-value for this test is 0.0002, i.e., the probability is much smaller than 0.05 and hence we can conclude that there is very strong evidence that the residents of Royal Hospital Chelsea on average are surviving beyond the 40th percentile of the E&W population.

Does the average resident of Royal Hospital Chelsea survive to the 50th percentile?

We can next proceed to asking whether the average resident of Royal Hospital Chelsea is surviving to the 50th percentile. The procedure is the same as above, but

we are now using the test statistic derived from the 50th percentile, i.e., we are using the observed percentage of deaths by the 50th percentile which is 57.6%

$$H_0: p = p_0$$
$$H_a: p > p_0$$

with a test statistic of:

$$z = \frac{0.576 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{4145}}} = 9.801$$

The value of the test statistic is 9.801 which is a lot greater than the critical value of 1.645. We therefore have very strong evidence that the average resident of Royal Hospital Chelsea is not surviving to the 50th percentile as the p-value of this test, i.e., the probability of seeing a result this far away from 0.5 by chance, if the true underlying probability is 0.5, is close to 0.

Does the average resident of Royal Hospital Chelsea survive to beyond the 50th percentile?

Our final hypothesis test does not have to be carried out for Royal Hospital Chelsea as we have already shown that the residents are not surviving to the 50th percentile, and so there is clearly no evidence that they are surviving to beyond the 50th percentile.

Summary for Royal Hospital Chelsea

In summary, we have strong evidence that the residents of Royal Hospital Chelsea are surviving to the 40th percentile of the E&W population but are not surviving to the 50th percentile. Whilst, at first glance, this may seem a disappointing result, we must remember that the residents of this almshouse are ex-military (i.e., an occupation which takes its toll on physical health) and also that the almshouse, more than the others, is acting partly as an end-of-life care facility. Therefore, not only are the almshouse residents facing the usual implications of coming from the lower socio-economic status of the population but also have to contend with these additional factors. It could therefore be argued that comfortably reaching the 40th percentile is a good result. It is also noteworthy that the average percentile reached for this population is the 45th percentile (which fits in with our conclusions).

5.2 Charterhouse

We now consider the residents of Charterhouse who in the data set are all male.

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	32	148	185	263
% of population who have died	8.4%	39.1%	48.8%	69.4%

Total observed deaths = 379

Table 5.2: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the same four hypothesis tests as we have just carried out for Royal Hospital Chelsea using the data set out in Table 5.2.

Does the average resident of Charterhouse survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.391 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{379}}} = -4.263$$

As with Royal Hospital Chelsea, we can see that this test statistic is negative and that there is therefore no evidence that residents of Charterhouse are not surviving to the 40th percentile.

Does the average resident of Charterhouse survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645 and so we have evidence that the male residents of Charterhouse are living beyond the 40th percentile on average. The p-value for this statistic is less than 0.0001 so we have very strong evidence that this is true.

Does the average resident of Charterhouse survive to the 50th percentile?

We can next proceed to asking whether the average resident of Charterhouse is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.488 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{379}}} = -0.462$$

As this test statistic is negative, we cannot reject the null hypothesis and therefore there is no evidence that residents of Charterhouse are not surviving to the 50th percentile on average. This makes intuitive sense as more than 50% of the residents survived to the 50th percentile.

Does the average resident of Charterhouse survive to beyond the 50th percentile?

Our test statistic here is -0.462. As this is greater than -1.645, we have little evidence that the residents of Charterhouse are living beyond the 50th percentile on average. The actual p-value of this test is 32.2% (and we would normally consider 5% as demonstrating statistical evidence).

Summary of Charterhouse

The results for Charterhouse look good as, for each of the four percentiles we are analysing, the observed residents had higher observed percentages of reaching those percentiles than the E&W population, i.e., the residents of Charterhouse are observed to be living longer than the standard population. However, as this is a small dataset, we needed to test for proof and while we certainly have no evidence that the residents are not surviving to the 50th percentile, unfortunately we do not have the statistical evidence that they are surviving to beyond the 50th percentile. For the residents of Charterhouse, the average percentile reached is 53, again showing evidence that the average resident is doing better than the standard population of E&W.

5.3 Summary of analysis for the larger almshouses

The Appendix provides details of the observed data and how we tested the hypotheses for the almshouses, other than Royal Hospital Chelsea and Charterhouse, where there were 75 or more residents for a given gender. Tables 5.3a and 5.3b show the distribution of lives dying before the key percentiles, together with the average percentile reached by the population, expressed in terms of both observed numbers (Table 5.3a) and percentage of population (Table 5.3b).

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Royal Hospital Chelsea	591	1,959	2,388	3,355	4,145	45
DAMHA Males	33	191	239	356	440	48
DAMHA Females	66	360	460	673	767	44
Morden College Males	53	181	238	402	591	57
Morden College Females	35	159	214	353	487	55
Charterhouse	32	148	185	263	379	53
Salisbury Males	15	65	90	132	174	52
Salisbury Females	39	164	213	326	422	51
Trinity Males	14	62	81	117	165	52
Richmond Males	10	45	52	74	94	47
Richmond Females	19	95	123	181	254	53
Richard Watts Females	6	30	40	59	75	48
Davenport Females	10	29	37	55	78	53

Table 5.3a – The observed number of deaths by selected percentiles for each almshouse population where the number of residents in the data set is 75 or more

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Royal Hospital Chelsea	14.3%	47.3%	57.6%	80.9%	100.0%	45
DAMHA Males	7.5%	43.4%	54.3%	80.9%	100.0%	48
DAMHA Females	8.6%	46.9%	60.0%	87.7%	100.0%	44
Morden College Males	9.0%	30.6%	40.3%	68.0%	100.0%	57
Morden College Females	7.2%	32.6%	43.9%	72.5%	100.0%	55
Charterhouse	8.4%	39.1%	48.8%	69.4%	100.0%	53
Salisbury Males	8.6%	37.4%	51.7%	75.9%	100.0%	52
Salisbury Females	9.2%	38.9%	50.5%	77.3%	100.0%	51
Trinity Males	8.5%	37.6%	49.1%	70.9%	100.0%	52
Richmond Males	10.6%	47.9%	55.3%	78.7%	100.0%	47
Richmond Females	7.5%	37.4%	48.4%	71.3%	100.0%	53
Richard Watts Females	8.0%	40.0%	53.3%	78.7%	100.0%	48
Davenport Females	12.8%	37.2%	47.4%	70.5%	100.0%	53

Table 5.3b – The observed proportion of deaths by selected percentiles for each almshouse population where the number of residents in the data set is 75 or more

The methodology for testing the four hypotheses for the other large almshouses is the same as that used for Royal Hospital Chelsea and Charterhouse described in Sections 5.1 and 5.2. Table 5.4 provides a summary of the conclusions reached for each of the four tests.

Almshouse Population	Evidence residents are not surviving on average to the 40th percentile?	Evidence residents are surviving on average beyond the 40th percentile?	Evidence residents are not surviving on average to the 50th percentile?	Evidence residents are surviving on average beyond the 50th percentile?
Royal Hospital Chelsea	No	Yes	Yes	No
DAMHA Males	No	Yes	Yes	No
DAMHA Females	No	Yes	Yes	No
Morden College Males	No	Yes	No	Yes
Morden College Females	No	Yes	No	Yes
Charterhouse	No	Yes	No	No
Salisbury Males	No	Yes	No	No
Salisbury Females	No	Yes	No	No
Trinity Males	No	Yes	No	No
Richmond Males	No	No	No	No
Richmond Females	No	Yes	No	No
Richard Watts Females	No	Yes	No	No
Davenport Females	No	Yes	No	No

Table 5.4: Summary of the hypothesis tests carried out on almshouses with 75 or more residents in the data set

5.4 Summary of analysis for the smaller almshouses

As for the larger almshouses above, the following two tables show the distribution of lives dying before the key percentiles, together with the average percentile reached by the population, expressed in terms of both observed numbers (Table 5.5a) and percentage of population (Table 5.5b). Due to the size of the populations, we did not carry out the hypothesis tests as the results would not be statistically conclusive.

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Hurst Females	2	7	7	13	20	55
Hurst Males	2	6	7	11	16	55
Leicester Females	0	9	13	21	34	61
Leicester males	0	4	4	8	15	68
Richard Watts Males	4	21	27	36	44	53
Sheppard Trust Females	1	4	7	14	18	55
St Martins Females	0	2	3	7	9	61
United St Saviour's Charity Females	1	5	7	9	10	39
United St Saviour's Charity Males	0	1	1	3	5	63

Table 5.5a – The observed number of deaths by selected percentiles for each almshouse population where the number of residents in the data set is below 75

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Hurst Females	10.0%	35.0%	35.0%	65.0%	100.0%	55
Hurst Males	12.5%	37.5%	43.8%	68.8%	100.0%	55
Leicester Females	0.0%	26.5%	38.2%	61.8%	100.0%	61
Leicester males	0.0%	26.7%	26.7%	53.3%	100.0%	68
Richard Watts Males	9.1%	47.7%	61.4%	81.8%	100.0%	53
Sheppard Trust Females	5.6%	22.2%	38.9%	77.8%	100.0%	55
St Martins Females	0.0%	22.2%	33.3%	77.8%	100.0%	61
United St Saviour's Charity Females	10.0%	50.0%	70.0%	90.0%	100.0%	39
United St Saviour's Charity Males	0.0%	20.0%	20.0%	60.0%	100.0%	63

Table 5.5b – The observed proportion of deaths by selected percentiles for each almshouse population where the number of residents in the data set is below 75

Table 5.6a and Table 5.6b give the distribution for two almshouses where we hope to be able to retrieve more data in the future and hence carry out a more thorough analysis.

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Walthamstow Males	0	13	15	26	31	53
Walthamstow Females	4	18	22	27	31	40
Yardley Males	0	4	5	10	10	49
Yardley Females	1	5	6	13	13	48

Table 5.6a – The observed number of deaths by selected percentiles for each almshouse population where the data set is currently incomplete

Almshouse	10th	40th	50th	75th	Total	Average Percentile
Walthamstow Males	0.0%	41.9%	48.4%	83.9%	100.0%	53
Walthamstow Females	12.9%	58.1%	71.0%	87.1%	100.0%	40
Yardley Males	0.0%	40.0%	50.0%	100.0%	100.0%	49
Yardley Females	7.7%	38.5%	46.2%	100.0%	100.0%	48

Table 5.6b – The observed proportion of deaths by selected percentiles for each almshouse population where the data set is currently incomplete

Having analysed the percentiles that the residents of the different almshouses have reached, in the next section we quantify the longevity boost that the residents of two of the almshouses have received.

6 Determining the longevity boost from living in Charterhouse and Royal Chelsea Hospital

In Section 5, we analysed, for each participating almshouse, the percentile of survival reached when compared to the general population of E&W. We have seen that the percentile of survival varies between almshouses, but we have not yet quantified what the apparent longevity boost seen in some of the almshouses actually means in terms of extra years. For this study, separately for each gender, we have examined a number of different almshouses over a number of years and over a wide variety of entry ages. We now wish to quantify the number of extra years of life that living in an almshouse may give a resident. To be able to this, we need to make some assumptions to simplify the calculations.

Firstly, we have to pick an almshouse. We have initially chosen Charterhouse and acknowledge that this is one of the better performing almshouses. However, we have chosen it as it has a detailed history of the lives of its residents. Also, as most residents live there until they die, or until shortly before their death, the data are very complete. We can therefore ascribe the increase in life expectancy to the resident's time in the almshouse rather than any care they received after they left. In addition, the criteria for entering Charterhouse are very much in keeping with how most people see almshouses, i.e., the residents of Charterhouse are generally from the lower socio-economic groups. While it has been, until recently, a male-only almshouse, this in itself is interesting, as a lot of the literature implies that male lives are the hardest to reach in terms of sociability, which we argue could be one of the key driving forces behind why almshouses increase the longevity of its residents.

The second set of assumptions we have to make is to enable us to turn the 100 years of history and various entry ages into one figure. We provide the details below.

6.1 Charterhouse

To calculate the difference in longevity between the residents of Charterhouse, and the general population, our methodology uses the percentiles of the population which we have introduced in the previous section.

Our first assumption is that the average percentile to which the Charterhouse residents live has remained constant over the 100-year period over which we have collected the data; our second assumption is that this average percentile is the same for all entry ages. We have analysed these assumptions and determined them to be true, allowing for the fact that our data set is small.

With these assumptions in place, we can use the average percentile that our recorded lives reached over the investigation, which is 53. We therefore assume all new entrants to Charterhouse reach the 53rd percentile. We have also calculated the average age of a Charterhouse resident at entry to be 73. We therefore assume that the increase in life expectancy that a resident can expect can be represented by an assumed new entrant in 2023, aged 73 who will reach the age equivalent to the 53rd percentile of the E&W population.

Using the mortality rates for 2023, which were calculated by Villegas and Haberman (2014), we have calculated that the median future life expectancy in E&W for a 73 year old in 2023 is 16.92 years. We have also calculated that the age at death for a life aged 73 who survives to the 53rd percentile is 17.58 years. We can therefore say that the boost in future life expectancy for the average new resident at Charterhouse when compared to the general population of E&W is 17.58-16.92 = 0.66 years.

However, we would argue that this number understates the benefit that a resident gets in terms of life expectancy from being a resident at Charterhouse. As we have noted before, life expectancy is strongly correlated to a person's socio-economic status, and we would argue that the average resident moving into Charterhouse is from the lowest of the socio-economic quintiles. From the same study by Villegas and Haberman (2014), life expectancy is broken down by socio-economic quintile, and the future life expectancy for someone from the lowest quintile in 2023 is 15.17 years. We therefore argue that the boost in life expectancy from living in Charterhouse is made up of two components which we call the "hidden boost" and the "transparent boost". The "hidden boost" is that obtained from increasing the life expectancy of a resident from that of the lowest socio-economic quintile to an average resident of E&W which is equal to 16.92-15.17 = 1.75 years. The "transparent boost" comes from increasing the life expectancy to the 53rd percentile which is calculated above as 0.66 years. Therefore, the total boost of future life

expectancy is 0.66 + 1.75 = 2.41 years. This equates to a boost in life expectancy of 15.9%.

It is interesting to note that if we calculate the future life expectancy of people in the second highest socio-economic quintile in E&W, their life expectancy is 17.53 years. This can be compared to the figure of 17.58 years for the new Charterhouse resident quoted above. In other words, living in Charterhouse appears to transform the residents' life expectancy from that of someone from the lowest socio-economic group to that of someone from the second highest, a remarkable achievement.

If we look more closely at the average age of a resident when they enter Charterhouse, then post-1950 the average age has been closer to 76 rather than 73 as we had assumed above. We can repeat our analysis using this new assumed entry age which gives the following. The implied life expectancy of a resident entering Charterhouse at 76 is 15.13 years compared to a life expectancy for the average citizen of E&W of 14.52 years. This gives us the equivalent "transparent boost" of 0.61 years, which can be compared to the 0.66 years for entry age 73. We find that the life expectancy of a 76-year-old in the lowest quintile is 13.19 years and so the "hidden boost" is 14.52 – 13.19 = 1.33 years. The total boost is therefore 1.94 years which is an increase in life expectancy of 14.7%. When we look at the future life expectancy of a 76-year-old from the second highest socio-economic quintile of the E&W population, we find that it is 15.01 years and so, once again, we conclude that being a resident of Charterhouse has boosted their future expected lifetime from that of someone in the lowest socio-economic quintile to that of the second highest.

6.2 Royal Hospital Chelsea

As we discussed earlier, the residents of Royal Hospital Chelsea had results which, at first glance, were disappointing in that the residents were not, on average, reaching the 50th percentile. However, we noted that Royal Hospital Chelsea residents have two factors working against them – that some of the residents may be using the hospital more as an end-of-life care facility than a traditional almshouse, and also that the residents are ex-servicemen, which is likely to affect their wellbeing.

We have now established a method that analyses how an almshouse can give both a "transparent boost" when compared to the standard E&W population, and a

“hidden boost” when we look at lives taken from the lowest socio-economic quintile. We now use the method to consider whether residents of Royal Hospital Chelsea appear to be getting any “hidden boost”.

When analysing the data, we find that the average age of entry for a resident at Royal Hospital Chelsea is 73 and, as we have noted previously, their average percentile is 45. Repeating the methodology, we determine that the life expectancy of a new entrant into Royal Hospital Chelsea at age 73 as 16.46 years. This is below the average life expectancy of E&W for a 73 year old of 16.92 years; however, as we have also seen above, the average future life expectancy of someone from the lowest socio economics quintile is 15.17 years. Therefore, Royal Hospital Chelsea is indeed providing a boost to life expectancy when compared to this lowest quintile.

We can then carry out the same calculation looking at the second lowest quintile and we calculate this to be 16.36 years, which is just less than the 16.46 years value found for our assumed new Royal Hospital Chelsea resident. Therefore, we can see that a resident of Royal Hospital Chelsea has had their life expectancy increased from that of the lowest socio-economic quintile to that of the next highest. Whilst not as impressive as that seen at Charterhouse, it is still noteworthy given the headwinds that Royal Hospital Chelsea residents in aggregate face.

7 Conclusion

The aim of this project was to expand on previous work which focused on one particular almshouse, Whiteley Village, and showed that female residents received a 'longevity boost', i.e., they had longer life expectancy compared to both the general E&W population and to the population from the lowest socio-economic quintile (Mayhew, Rickayzen and Smith, 2017). We have investigated whether a similar boost is achieved by residents in other almshouses throughout England. A secondary goal was exploring whether any potential underlying causes of this longevity boost may be proposed based on the structures of the almshouses (social support and activity) where residents particularly benefit from this said boost.

When examining the data from several almshouses, and assuming that the residents are drawn from the lowest socio-economic quintile, we have found that residents are getting a boost relative to their peers who are not living in almshouses. Many of the almshouses appear to confer a longevity boost that increases their residents' life expectancy to that of a level achieved by an average member of the general population, which itself is a notable outcome. Furthermore, the best performing almshouses (Morden College and Charterhouse) have shown a boost which increases life expectancy to that of a life in the second highest socio-economic group. This finding is consistent with the results that Mayhew, Rickayzen and Smith (2017) obtained for the female residents of Whiteley Village.

To meet the secondary goal of this project, we have conducted a contextual analysis exploring the potential causes of longevity boosts in the best performing almshouses. It is important to note that we can only speculate on such causes, especially in light of substantial differences in the socio-economic, lifestyle, psychosocial and other backgrounds of the residents. Our suggestions here warrant further research which should include involvement and conversation with the current residents themselves.

As noted above, two of the best performing almshouses, in terms of longevity boost, were Charterhouse and Morden College. These two almshouses have a very focused centre physically as they are both based in one or two main buildings, and also communally as, for example, Charterhouse and Morden College both have

community dining rooms where residents can eat and socialise together. We speculate that this strong sense of community and interaction is combatting the loneliness ‘epidemic' that previous research has identified as being especially prominent among older age groups, with those aged 70-79 most affected by social isolation (Röhr et al., 2022). The presence of this social component in Charterhouse and Morden College might then support the idea of a reduction in loneliness among residents, which could then lead to better physical and mental health (Gerino et al., 2017). Having said that, it is also important to note that Morden College residents may be of a more privileged background when compared to most other almshouse residents since, although now in financial hardship, they (or their spouse) tend to have come from a managerial background.

Our study includes data for some of the almshouses where residents come from industrial or military backgrounds which could have a significant detrimental impact on their quality and length of life. For example, we believe the outcome for the Royal Hospital Chelsea to be excellent given the ex-military status of the residents, as well as the fact that many of them might have moved directly into the hospital facilities rather than the almshouse itself. Unfortunately, the data with which we were provided did not enable us to distinguish between the two types of entrants. Similarly, it could be pointed out that DAMHA, which has some of the least positive results, is a physically much more dispersed almshouse set-up and so will find it harder to generate the same sense of community. This is compounded by the fact that more residents seem to move from the almshouse either back to the community or to another almshouse when compared to the residents in the other almshouses of this study. We also believe it is important to consider their prior heavy industry involvement, which could be leading to a shorter life expectancy. In addition, it should be noted that as we discussed in the methodology, we were only provided with data for DAMHA for 1997 onwards. This means the results for this almshouse are skewed against showing any longevity boost since it is impossible to include long-lived lives in our calculations for the younger entrants.

If we consider all the almshouses that participated in the study, a common theme is that they have all created a strong sense of community. We believe that this is one of the major contributors to the boost in life expectancy of almshouse residents when compared to similar people from the same socio-economic groupings. For example,

a recent systematic review compiled the findings of 17 studies that investigated loneliness in older people living in care homes and found alarming rates of loneliness – a mean of 61% participants experienced moderate levels of social isolation (Gardiner et al., 2020). By contrast, as we have noted in the contextual analysis, all of the almshouses have some form of social activity and involvement, which makes them different to other types of standard sheltered housing, as well as regular care homes. We should highlight once more that the current study can only speculate about the benefits of community living, and further research is required to determine a full outline of the factors that may be contributing to the longevity boost.

We are not suggesting that living in an almshouse would suit everybody, nor that it would provide an automatic boost in longevity to everyone. The social interaction that we believe could be a significant reason why living in an almshouse might boost longevity will only work if residents enjoy this type of environment. In fact, it could be argued that almshouses attract sociable people who may not have suffered from the same isolation even if they had not lived in an almshouse, i.e., they would have lived longer anyway. However, the almshouse set up guarantees access to a community where the resident feels safe and connected and hence provides a way for such a person to gain in life expectancy, and in their standard of living. Without living in an almshouse, circumstances could conspire against them, and they might become socially isolated (with a consequent reduction in life expectancy).

Another reason that the longevity boost may not all be due to living in an almshouse is that there is a selection effect caused by those in poorer health and those unable to live independently generally being ineligible to enter the almshouse in the first place. Once admitted, however, a resident is likely to be provided with the care support they need if their health deteriorates, allowing them to remain at the almshouse until they require specialist end-of-life care.

As well as providing a longevity boost, an additional benefit of an almshouse community is that it helps to reduce delays in hospital discharges for almshouse residents (Housing LIN, 2021). This is because an almshouse can provide the necessary support to enable a hospitalised resident to be discharged as soon as they are physically ready. This is in contrast to a patient who lives in social isolation who may not be well or confident enough to look after themselves without further

support, and therefore cannot be discharged from hospital. We believe, therefore, that a government policy to increase the number of almshouses (or equivalent), could save money from other parts of the welfare budget, as well as improving the standard of life of the recipients. Further investigation of the potential benefits of socialising could lead to government policy being directed appropriately in terms of maximising the benefits from all forms of sheltered housing and can be seen as part of the levelling up agenda.

8 Key Findings

- Our analysis has shown that residents in almshouses in England are receiving a longevity boost relative to people of the same socio-economic group from the wider population.
- The best performing almshouses in the study, Charterhouse and Morden College, have shown a longevity boost which increases life expectancy to that of a life in the second highest socio-economic group, which is a remarkable outcome.
- We estimate that a 73 year old male entering Charterhouse today would receive a longevity boost of 2.4 years (an extra 15% of future lifetime at the point of joining) compared to his peers from the same socio-economic group, and 0.7 years when compared to an average 73 year old from the general population.
- This longevity boost could be due to the strong sense of community and social interaction within almshouses which leads to better physical and mental health and helps combat the loneliness epidemic amongst older age groups.
- For the almshouses in the study which, at first glance, did not appear to perform so well, we postulate that this could be due to their residents' background of working in heavy industry or serving in the military. In other words, any boost could be masked by these additional negative factors which tend to have the effect of reducing life expectancy.
- An additional benefit of an almshouse community is that it provides the necessary support to enable hospitalised residents to be discharged as soon as they are physically ready.
- We recognise that further research is needed to fully understand the factors contributing to the longevity boost in almshouses so that the effects can be maximised and replicated in sheltered housing more generally.
- Our conclusion is that almshouses (or their equivalents) could help in the Government's aim to reduce mortality inequalities experienced in lower socio-economic groups.

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APPENDIX

We present here the details of our statistical analysis in respect of the almshouses with 75 residents or more in our data set.

A.1 Durham Aged Mineworkers Homes Association (DAMHA)

We now consider the residents of DAMHA. As noted in Section 4, the DAMHA dataset that was made available to us is very recent with data only starting in 1997. The effect of this on our data is that the newer residents skew the results slightly as they are unable to reach the highest percentiles.

DAMHA male residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	33	191	239	356
% of population who have died	7.5%	43.4%	54.3%	80.9%

Total observed deaths = 440

Table A.1a: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before. As the methodology is the same as for the Royal Hospital Chelsea and Charterhouse in Section 5, we will just consider the statistics.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.434 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{440}}} = -2.765$$

We can see that as this test statistic is negative that there is no evidence that male residents of DAMHA are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645 and so we have evidence that the male residents of DAMHA are living beyond the 40th percentile on average. The p-value for this statistic is 0.0028 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average male resident of DAMHA is surviving to the 50th percentile.

$$H_0: p = p_0$$
$$H_a: p > p_0$$

with a test statistic of:

$$z = \frac{0.543 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{440}}} = 1.812$$

The value of the test statistic is 1.812. As this statistic is greater than 1.645, we have sufficient evidence to reject this claim at the 5% significance level. The actual p-value of this test is 3.50% and so we have statistical proof that male residents at DAMHA are not making it to the 50th percentile on average.

Does the average male resident of DAMHA make it beyond the 50th percentile?

Our final hypothesis test does not have to be carried out for male DAMHA residents as we have already proven that the residents are not making it to the 50th percentile so there is no evidence that they are making it beyond the 50th percentile.

DAMHA female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	66	360	460	673
% of population who have died	8.6%	46.9%	60.0%	87.7%

Total observed deaths = 767

Table A.1b: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.469 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{767}}} = -1.697$$

Similar to previously, we can see that as this test statistic is negative that there is no evidence that female residents of DAMHA are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is only just less than -1.645 and so the evidence is not as clear as for our previous datasets that the female residents of DAMHA are living beyond the 40th percentile on average. The p-value for this statistic is 0.0448 so we still have evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of DAMHA is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.600 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{767}}} = 5.525$$

The value of the test statistic is 5.525. As this statistic is much greater than 1.645, we have strong evidence to reject this claim at the 5% significance level. The actual p-value of this test is much less than 0.0001.

Does the average female resident of DAMHA make it beyond the 50th percentile?

Our final hypothesis test does not have to be carried out for female DAMHA residents as we have already proven that the residents are not making it to the 50th percentile so there is no evidence that they are making it beyond the 50th percentile.

Summary for DAMHA residents

In a similar way to Royal Hospital Chelsea, the results for DAMHA residents are at first glance somewhat disappointing. However, the male residents have significant evidence that they are living to beyond the 40th percentile and as historically DAMHA residents were involved with the mining industry, the impact of this on their health will be hard to combat through living in an almshouse. For the female residents, our evidence of them living beyond the 40th percentile was only just significant at the 5% level. However, as we have noted before, as we only have access to very recent data this skews the results particularly for females as to reach the higher percentiles and be recorded in our analysis lives need to die beyond the age of 90 which is not always possible in the period of observation. For the residents of DAMHA, the average percentile reached 48 for males and 44 for females which is consistent with the statistical results described above.

A.2 Morden College

We now consider the residents of Morden College.

Morden College male residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	53	181	238	402
% of population who have died	9.0%	30.6%	40.3%	68.0%

Total observed deaths = 591

Table A.2a: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.403 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{591}}} = -9.420$$

As for our previous almshouse, we can see that as this test statistic is negative that there is no evidence that male residents of Morden College are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645 and so we have very significant evidence that the male residents of Morden College are living beyond the 40th percentile on average. The p-value for this statistic is less than 0.0001 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average male resident of Morden College is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.403 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{591}}} = -4.730$$

The value of the test statistic is -4.730. As this statistic is negative, we cannot reject the null hypothesis and therefore there is no evidence that male residents of Morden

College are not making it to the 50th percentile on average. This makes intuitive sense as more than 50% of the residents survived to the 50th percentile.

Does the average male resident of Morden College make it beyond the 50th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

Our test statistic here is -4.730. As this is significantly less than -1.645, we have very strong evidence that the male residents of Morden College are living beyond the 50th percentile on average. The actual p-value of this test is less than 0.0001.

Morden College female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	35	159	214	353
% of population who have died	7.2%	32.6%	43.9%	72.5%

Total observed deaths = 487

Table A.2b: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.326 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{487}}} = -7.658$$

As for our previous almshouse, we can see that as this test statistic is negative that there is no evidence that female residents of Morden College are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the female residents of Morden College are living beyond the 40th percentile on average. The p-value for this statistic is less than 0.0001 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of Morden College is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.439 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{487}}} = -2.674$$

The value of the test statistic is -2.674. As this statistic is negative, we cannot reject the null hypothesis and therefore there is no evidence that female residents of Morden College are not making it to the 50th percentile on average. This makes intuitive sense as more than 50% of the residents survived to the 50th percentile.

Does the average female resident of Morden College make it beyond the 50th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

Our test statistic here is -2.674. As this is significantly less than -1.645, we have very strong evidence that the female residents of Morden College are living beyond the 50th percentile on average. The actual p-value of this test is 0.0037.

Summary of Morden College

The results for Morden College look good as for each of the four percentiles for both genders we are analysing, the observed residents had higher observed percentages of reaching those percentiles than the E&W population, i.e., the residents of Morden

College are observed to be living longer than the standard population. However, as this is a small dataset we needed to test for proof. For this almshouse we have very strong statistical evidence that the average resident for both genders is living beyond the 50th percentile. For the residents of Morden, the average percentile reached 57 for males and 55 for females again showing evidence that the average resident is doing better than the standard population of E&W.

A.3 Salisbury City Almshouse

We now consider the residents of Salisbury City Almshouse.

Salisbury City Almshouse male residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	15	65	90	132
% of population who have died	8.6%	37.4%	51.7%	75.9%

Total observed deaths = 174

Table A.3a: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.374 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{174}}} = -3.336$$

As for our previous almshouses, we can see that as this test statistic is negative that there is no evidence that male residents of Salisbury City Almshouses are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the male residents of Salisbury City Almshouse are living beyond the 40th percentile on average. The p-value for this statistic is 0.0004 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average male resident of Salisbury City Almshouse is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.517 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{174}}} = 0.455$$

The value of the test statistic is 0.455. As this statistic is less than 1.645, there is insufficient evidence to reject the null hypothesis, i.e., that there is little evidence that the male residents of Salisbury are not making it to the 50th percentile. The p-value for this statistic is 0.3246.

Does the average male resident of Salisbury City Almshouse make it beyond the 50th percentile?

Our test statistic here is positive so we have no evidence that the male residents of Salisbury City Almshouse are on average making it beyond the 50th percentile.

Salisbury City Almshouse female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	39	164	213	326
% of population who have died	9.2%	38.9%	50.5%	77.3%

Total observed deaths = 422

Table A.3b: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.389 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{422}}} = -4.576$$

As for our previous almshouse, we can see that as this test statistic is negative that there is no evidence that female residents of Salisbury City Almshouse are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the female residents of Salisbury City Almshouses are living beyond the 40th percentile on average. The p-value for this statistic is less than 0.0001 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of Salisbury City Almshouse is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.505 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{422}}} = 0.195$$

The value of the test statistic is 0.195. As this statistic is less than 1.645, there is insufficient evidence to reject the null hypothesis, i.e., that there is little evidence that

the female residents of Salisbury City Almshouse are not making it to the 50th percentile. The p-value for this statistic is 0.4228.

Does the average female resident of Salisbury City Almshouse make it beyond the 50th percentile?

Our test statistic here is positive so we have no evidence that the female residents of Salisbury City Almshouse are on average making it beyond the 50th percentile.

Summary of Salisbury City Almshouse

The results for Salisbury City Almshouse look good as for each of the four percentiles for both genders we are analysing, the observed residents had similar observed percentages of reaching those percentiles as the E&W population, i.e., the residents of Salisbury City Almshouse are observed to be living similar lives to the standard population. This is backed up by the hypotheses tests as for both genders there was strong evidence that the average resident was living beyond the 40th percentile while the evidence for the 50th percentile was that there was no evidence that they were not reaching it nor exceeding it, i.e., it is likely that they were similar to the standard population. For the residents of Salisbury City Almshouse, the average percentile reached 52 for males and 51 for females again showing evidence that the average resident is similar to the standard population of E&W.

A.4 Trinity Hospital

We now consider the residents of Trinity Hospital.

Trinity Hospital male residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	14	62	81	117
% of population who have died	8.5%	37.6%	49.1%	70.9%

Total observed deaths = 165

Table A.4: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.376 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{165}}} = -3.192$$

As for our previous almshouses, we can see that as this test statistic is negative that there is no evidence that male residents of Salisbury City Almshouse are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the male residents of Trinity Hospital are living beyond the 40th percentile on average. The p-value for this statistic is 0.0007 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average male resident of Trinity Hospital is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

with a test statistic of:

$$z = \frac{0.491 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{165}}} = -0.234$$

The value of the test statistic is -0.234. As this statistic is negative, we cannot reject the null hypothesis and therefore there is no evidence that residents of Trinity

Hospital are not making it to the 50th percentile on average. This makes intuitive sense as more than 50% of the residents survived to the 50th percentile.

Does the average resident of Trinity Hospital make it beyond the 50th percentile?

Our test statistic here is -0.234. As this is greater than -1.645, we have little evidence that the residents of Trinity Hospital are living beyond the 50th percentile on average. The actual p-value of this test is 40.77%.

Summary of Trinity Hospital

The results for Trinity Hospital look good as for each of the four percentiles we are analysing, the observed residents had higher observed percentages of reaching those percentiles than the E&W population, i.e., the residents of Trinity Hospital are observed to be living longer than the standard population. However, as this is a small dataset we needed to test for proof and while we certainly have no evidence that the residents are not making it to the 50th percentile, unfortunately we do not have the statistical evidence that they are making it beyond the 50th percentile. For the residents of Trinity Hospital, the average percentile reached is 52 again showing that the average resident is similar to that of the standard population of E&W.

A.5 Richmond Charities

We now consider the residents of Richmond Charities.

Richmond Charities male residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	10	45	52	74
% of population who have died	10.6%	47.9%	55.3%	78.7%

Total observed deaths = 94

Table A.5a: Observed number and proportion of male deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.479 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{94}}} = -0.413$$

As for our previous almshouses, we can see that as this test statistic is negative that there is no evidence that male residents of Richmond Charities are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is greater than -1.645, and so we little evidence that the male residents of Richmond Charities are living beyond the 40th percentile on average. The p-value for this statistic is 0.3400 showing that we have very little evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average male resident of Salisbury City Almshouse is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.553 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{94}}} = 1.031$$

The value of the test statistic is 1.031. As this statistic is less than 1.645 there is insufficient evidence to reject the null hypothesis, i.e., that there is little evidence that

the male residents of Richmond are not making it to the 50th percentile. The p-value for this statistic is 0.1512.

Does the average male resident of Richmond Charities make it beyond the 50th percentile?

Our test statistic here is positive so we have no evidence that the male residents of Richmond Charities are on average making it beyond the 50th percentile.

Richmond Charities female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	19	95	123	181
% of population who have died	7.5%	37.4%	48.4%	71.3%

Total observed deaths = 254

Table A.5b: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.374 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{254}}} = -4.016$$

As for our previous almshouse, we can see that as this test statistic is negative that there is no evidence that female residents of Richmond Charities are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the female residents of Richmond Charities are living beyond the 40th

percentile on average. The p-value for this statistic is less than 0.0001 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of Richmond Charities is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.484 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{254}}} = -0.502$$

The value of the test statistic is -0.502. As this statistic is negative there is no evidence to reject the null hypothesis, i.e., that there is no evidence that the female residents of Richmond Charities are not making it to the 50th percentile.

Does the average female resident of Richmond Charities make it beyond the 50th percentile?

Our test statistic here is greater than -1.645, so we have little evidence that the female residents of Richmond Charities are on average making it beyond the 50th percentile. The p-value of the test is 0.3078.

Summary of Richmond Charities

The results for Richmond Charities show a difference between the two genders. For males, the observed deaths were higher than for the standard population but still there was no evidence that the average male resident wasn't reaching the 40th percentile. However, there was some but not enough evidence that they might not be reaching the 50th percentile but the relatively small data set for males means that conclusions are hard to reach. For females, we had strong evidence that the average resident was living beyond the 40th percentile and some evidence, though not statistically significant, that they were living beyond the 50th percentile. To support

these conclusions, we can note that the average percentile for the male residents was 47 whereas the females reached the 53rd percentile.

A.6 Richard Watts Charity

We now consider the female residents of Richard Watts Charity as the number of male residents is too small for a more thorough analysis.

Richard Watts Charity female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	6	30	40	59
% of population who have died	8.0%	40.0%	53.3%	78.7%

Total observed deaths = 75

Table A.6: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.400 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{75}}} = -1.732$$

As for our previous almshouse, we can see that as this test statistic is negative that there is no evidence that female residents of Richard Watts Charity are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is less than -1.645, and so we have significant evidence that the female residents of Richard Watts Charity are living beyond the 40th percentile on

average. The p-value for this statistic is 0.0416 so we have significant evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of Richard Watts Charity is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.533 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{75}}} = 0.577$$

The value of the test statistic is 0.577. As this statistic is less than 1.645 there is insufficient evidence to reject the null hypothesis, i.e., that there is no evidence that the female residents of Richard Watts Charity are not making it to the 50th percentile. The p-value of the test is 0.2819.

Does the average female resident of Richard Watts Charity make it beyond the 50th percentile?

Our test statistic here is positive and so we have no evidence that the female residents of Richard Watts Charity are on average making it beyond the 50th percentile.

Summary of Richard Watts Charity

For the female residents of Richard Watts Charity, we had strong evidence that the average resident was living beyond the 40th percentile little evidence supporting the assumption they were not making it to the 50th percentile but no evidence that they were making it beyond the 50th percentile. To support these conclusions, we can note that the average percentile for the female residents reached the 48th percentile.

A.7 Davenport Homes

We now consider the residents of Davenport Homes.

Davenport Homes female residents

Percentage of deaths from EW population	10%	40%	50%	75%
Observed deaths	10	29	37	55
% of population who have died	12.8%	37.2%	47.4%	70.5%

Total observed deaths = 78

Table A.7: Observed number and proportion of female deaths by selected percentiles of E&W population

We will now carry out the four hypothesis tests as before.

Do lives survive to the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.372 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{78}}} = -2.265$$

As for our previous almshouses, we can see that as this test statistic is negative that there is no evidence that female residents of Davenport Homes are not making it to the 40th percentile.

Do lives survive beyond the 40th percentile?

$$H_0 : p = 0.5$$
$$H_a : p < 0.5$$

The test statistic here is clearly less than -1.645, and so we have very significant evidence that the female residents of Davenport Homes are living beyond the 40th percentile on average. The p-value for this statistic is 0.0118 so we have very strong evidence that this is true.

Do lives survive to the 50th percentile?

We can next proceed to asking whether the average female resident of Davenport Homes is surviving to the 50th percentile.

$$H_0 : p = 0.5$$
$$H_a : p > 0.5$$

Test statistic

$$z = \frac{0.474 - 0.5}{\sqrt{\frac{0.5 \times (1 - 0.5)}{78}}} = -0.453$$

The value of the test statistic is -0.453. As this statistic is negative, we cannot reject the null hypothesis and therefore there is no evidence that residents of Davenport Homes are not making it to the 50th percentile on average. This makes intuitive sense as more than 50% of the residents survived to the 50th percentile.

Does the average resident of Davenport Homes make it beyond the 50th percentile?

Our test statistic here is -0.453. As this is greater than -1.645, we have little evidence that the residents of Davenport Homes are living beyond the 50th percentile on average. The actual p-value of this test is 32.53%.

Summary of Davenport Homes

The results for Davenport Homes look good as for each of the four percentiles we are analysing, the observed residents had higher observed percentages of reaching those percentiles than the E&W population, i.e., the residents of Davenport Homes are observed to be living longer than the standard population. However, as this is a small dataset we needed to test for proof and while we certainly have no evidence that the residents are not making it to the 50th percentile, unfortunately we do not have the statistical evidence that they are making it beyond the 50th percentile. For the residents of Davenport Homes, the average percentile reached is 53 again showing that the average resident is similar or slightly better when compared to the standard population of E&W.

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