

Article title: Place-of-Death Disparities by Underlying Cause of Death and Associations With Specialist Palliative Care and Generalist Home Care Among Older Decedents in Taiwan: A Nationwide Population-Based Study

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Supplementary file 1

Table S1. STROBE Statement: checklist of items that should be included in reports of cross-sectional studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State-specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	Supplementary Figure 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7-8
		(b) Describe any methods used to examine subgroups and interactions	7-8
		(c) Explain how missing data were addressed	Supplementary Figure 1
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g., numbers potentially eligible, examined for	Supplementary Figure 1

		eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed	
		(b) Give reasons for non-participation at each stage	Supplementary Figure 1
		(c) Consider the use of a flow diagram	Supplementary Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders	8-15
		(b) Indicate the number of participants with missing data for each variable of interest	Supplementary Figure 1
Outcome data	15*	Report numbers of outcome events or summary measures	8-15
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included	15-18
		(b) Report category boundaries when continuous variables were categorized	15-18
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	15-18
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarize key results with reference to study objectives	18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	22
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	19-21
Generalizability	21	Discuss the generalizability (external validity) of the study results	22
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page

* Provides information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and provides the methodological background and published examples of transparent reporting. The STROBE checklist was used in conjunction with this article (freely available on the websites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information about the STROBE Initiative is available at www.strobe-statement.org.

Table S2. ICD Codes Used to Identify Underlying Causes of Death Eligible for Palliative Care Reimbursement under Taiwan's National Health Insurance Program

Diagnostic cluster	ICD-9	ICD-10
Cancer	140.x-208.x, 238.7, 273.3, 277.8	C00.x-C97.x
Liver disease	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.59, 456.0, 456.1, 456.8, 570, 571.x-573.x	B18.x, I85.0x, I86.4, K70.x, K71.0, K71.1x, K71.3, K71.4, K71.5x, K71.6, K71.7, K71.8, K71.9, K72.1x, K72.9x, K73.x, K74.x, K75.x, K76.x, K77
Lung disease	415.19, 416.8, 416.9, 490.x-505.x, 506.4, 508.1, 508.8, 519.1 277.00	I27.8x, I27.9, J40.x-J47.x, J60.x-J67.x, J68.4, J70.1, J70.2, J70.3 E84.0
Cerebrovascular disease	430.x-438.x, 340, 332.x, 333.0, 333.1	G45.x, G46.x, H34.0, I60.x-I69.x, G35, G20, G21.x, G23.x, G10
Kidney disease	583.6, 583.7, 584.5, 584.6, 584.7, 584.8, 584.9, 585, 586, 593.9	N17.x, N18.4, N18.5, N18.6, N18.9, N19, N18.0, N18.8
Cardiovascular disease	398.90, 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 414.8, 425.2, 425.4, 425.5, 425.7, 425.8, 425.9, 428.x, 779.8	I09.81, I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5-I42.9, I43.x, I50.x, P29.0
Dementia	290.x, 291.1, 291.2, 292.82, 294.1, 294.8, 294.9, 331.0, 331.1, 331.2	F01.x-F03.x, F10.27, F10.97, F13.27, F13.97, F18.27, F18.97, F19.27, F19.97, G30.x, G31.x
Others (Motor neuron diseases, Myelodysplastic syndromes, Age-related frailty, Others, Rare Disease)	335.20, 335.21, 335.22, 335.24, 335.29 284.9, 285, 238.7 797 277.00, 331.7, 333, 333.4, 334.x, 335.10, 335.20, 335.21, 335.9, 349.89, 356.0, 359.0, 359.1, 416.0, 719.60, 719.61, 719.62, 719.63, 719.64, 723.5, 754.89, 757.39, 780.03, 781.3, 781.91, 781.99 237.72, 251.1, 253.2, 253.3, 255.1, 255.4, 255.5, 258.1, 259.4, 259.8, 266.2,	G12.2x D46.x R54 E84.9, G10, G11.x, G12.21, G12.9, G31.2, G32.8x, G60.2, G71.0, G71.2, G90.3, I27.0, Q74.3, Q81.x, R27.x, R29.8xx, R40.3 D56.0, D56.1, D59.3, D59.5, D68.59, D71, D80.5, D81.0, D81.1, D81.2, D81.810, D81.819, D81.9, D82.0, D82.1, D82.4, D84.1,

Diagnostic cluster	ICD-9	ICD-10
	269.3, 270.0-270.8, 271.0, 271.1, 271.4, 271.8, 272.0, 272.3, 272.6-272.9, 275.1, 275.3, 275.49, 277.00, 277.1-277.3, 277.5, 277.6, 277.8, 277.9, 279.04, 279.05, 279.11, 279.12, 279.2, 279.3, 279.8, 282.4, 283.11, 283.2, 287.1, 287.8, 288.1, 289.8, 299.8x, 319, 330.0, 330.1, 330.8, 331.89, 333.0, 333.4, 333.91, 334.0., 334.1, 334.3, 334.8, 335.10, 335.20-335.22, 335.24, 335.29, 335.9, 340, 341.8, 345.11, 345.2, 345.3, 356.0-356.2, 359.2, 359.8, 362.70, 416.0, 448.0, 576.2, 628.1, 705.0, 728.11, 731.0, 742.2, 743.41, 743.44, 747.89, 751.5, 751.60, 751.69, 753.14, 755.38, 755.39, 755.53-755.59, 755.67, 755.69, 755.8, 756.0, 756.3, 756.4, 756.51, 756.52, 756.54, 756.54, 756.56, 756.59, 756.8x, 756.9, 757.1, 757.2, 757.31, 757.33, 757.39, 758.3, 758.8x, 759.1, 759.5-759.7, 759.81, 759.89, 775.1, 780.51, 780.53, 780.57, 785.59, 271.3+270.1	D84.8, E16.1, E20.1, E23.0, E26.81, E27.49, E31.0, E34.3, E34.8, E61.5, E70.0, E70.1, E70.20, E70.21, E70.41, E70.8, E70.9, E71.0, E71.110, E71.118, E71.120, E71.19, E71.3x, E71.41, E71.510, E71.511, E71.520, E71.521, E71.528, E71.529, E71.540, E72.03, E72.04, E72.11, E72.19, E72.20, E72.23, E72.29, E72.3, E72.4, E72.51, E72.52, E72.59, E72.8, E74.01, E74.02, E74.03, E74.04, E74.09, E74.21, E74.4, E74.8, E75.00, E75.11, E75.19, E75.2x, E75.4, E75.5, E76.x, E76.3, E77.0, E77.1, E77.8, E78.0, E78.3, E78.70, E78.71, E78.72, E79.1, E80.2x, E83.01, E83.09, E83.31, E83.32, E83.39, E84.9, E85.1, E88.01, E88.1, E88.40, E88.41, E88.49, E88.9, F78, F84.2, F84.8, G10, G11.1, G11.3, G11.4, G12.2x, G12.9, G23.0, G25.82, G31.82, G31.89, G35, G37.8, G40.311, G47.35, G60.0, G71.0, G71.11, G71.13, G71.2, G71.8, G87.0, H35.50, H49.811, H35.50, H49.81x, I27.0, I78.0, K83.1, L74.4, M61.10, M61.11x, M61.12x, M61.13x, M61.14x, M61.15x, M61.16x, M61.17x, M61.18, M61.19, M88.x, P70.2, Q04.3, Q13.4, Q28.8, Q43.8, Q44.7, Q61.19, Q71.6x, Q72.7x, Q74.0, Q74.8, Q75.1, Q75.4, Q77.2, Q77.3, Q77.4, Q77.8, Q78.0, Q78.1, Q78.2, Q78.3, Q79.6, Q79.8, Q80.2, Q80.3, Q80.4, Q81.9, Q82.3, Q82.4, Q82.8, Q85.02, Q85.1, Q85.8, Q87.0, Q87.1, Q87.2, Q87.3, Q87.89, Q89.1, Q89.7, Q89.8, Q93.5, Q93.88, Q93.89, Q97.8, Q98.8, Q99.8, E74.31+E70.0, E71.120+E72.11

Table S3. Adjusted odds ratio of place of death in association with diagnosis of underlying cause of death, palliative care utilization, home care utilization, and covariates in Taiwan, 2014–2023

Variables	Place of death (reference category: hospital death)			
	Home (95% CI)	Inpatient palliative care units (95% CI)	Long term care facilities (95% CI)	Others (95% CI)
Primary cause of death				
Cancer	1.00	1.00	1.00	1.00
Dementia	0.88 (0.85 – 0.91)	1.21 (1.14 – 1.28)	3.96 (3.72 – 4.21)	1.52 (1.40 – 1.66)
Cerebrovascular diseases	0.74 (0.72 – 0.76)	0.38 (0.36 – 0.41)	2.06 (1.95 – 2.18)	1.81 (1.71 – 1.91)
Cardiovascular diseases	0.63 (0.62 – 0.64)	0.36 (0.35 – 0.38)	1.98 (1.89 – 2.08)	1.14 (1.09 – 1.20)
Lung diseases	0.73 (0.71 – 0.74)	0.29 (0.27 – 0.30)	2.39 (2.27 – 2.52)	1.26 (1.19 – 1.33)
Liver diseases	0.57 (0.55 – 0.58)	0.33 (0.30 – 0.35)	0.66 (0.59 – 0.74)	0.67 (0.60 – 0.74)
Kidney diseases	0.53 (0.52 – 0.54)	0.68 (0.65 – 0.71)	0.91 (0.84 – 0.98)	0.90 (0.84 – 0.97)
Others	5.54 (5.29 – 5.79)	0.56 (0.48 – 0.65)	5.63 (5.14 – 6.17)	5.87 (5.38 – 6.39)
Palliative care utilization one year before death (reference to non-user)				
Palliative home care	5.44 (5.30 – 5.58)	5.83 (5.65 – 6.00)	13.11 (12.55 – 13.70)	2.57 (2.37 – 2.79)
Inpatient palliative care ^a	6.91 (6.62 – 7.22)	–	5.64 (5.22 – 6.10)	5.82 (5.20 – 6.52)
Inpatient shared care	0.67 (0.66 – 0.68)	3.14 (3.07 – 3.21)	0.49 (0.47 – 0.51)	0.33 (0.32 – 0.35)
Home care services utilization one year before death				
Any nurse visit (vs. none)	1.12 (1.08 – 1.15)	1.04 (0.98 – 1.10)	1.31 (1.22 – 1.41)	1.02 (0.93 – 1.11)
Total nurse visits (continuous, among users) ^b	1.00 (1.00 – 1.01)	1.02 (1.01 – 1.04)	1.01 (0.99 – 1.02)	1.00 (0.98 – 1.01)
Any physician visit (vs. none)	1.40 (1.36 – 1.44)	0.98 (0.93 – 1.04)	0.61 (0.56 – 0.65)	0.93 (0.85 – 1.02)
Total physician visits (continuous, among users) ^b	1.02 (1.01 – 1.02)	0.99 (0.98 – 1.00)	0.97 (0.95 – 0.99)	1.00 (0.98 – 1.01)
Gender				
Male	1.00	1.00	1.00	1.00
Female	1.08 (1.06 – 1.09)	1.12 (1.10 – 1.14)	0.95 (0.92 – 0.98)	0.99 (0.96 – 1.03)

Age group				
65–69	1.00	1.00	1.00	1.00
70–74	1.10 (1.08 – 1.13)	1.05 (1.01 – 1.08)	1.17 (1.10 – 1.24)	0.90 (0.85 – 0.96)
75–79	1.21 (1.18 – 1.23)	1.07 (1.03 – 1.10)	1.30 (1.22 – 1.37)	0.85 (0.80 – 0.90)
80–84	1.26 (1.23 – 1.28)	1.13 (1.09 – 1.17)	1.37 (1.30 – 1.45)	0.75 (0.71 – 0.79)
85–89	1.21 (1.19 – 1.24)	1.18 (1.14 – 1.22)	1.31 (1.24 – 1.39)	0.60 (0.56 – 0.63)
90+	1.27 (1.24 – 1.30)	1.36 (1.31 – 1.42)	1.30 (1.22 – 1.37)	0.49 (0.46 – 0.52)
Marriage				
Married	1.00	1.00	1.00	1.00
Unmarried	0.40 (0.38 – 0.41)	1.01 (0.96 – 1.06)	1.79 (1.68 – 1.91)	0.76 (0.70 – 0.83)
Widow	0.90 (0.89 – 0.91)	1.01 (0.99 – 1.03)	1.43 (1.38 – 1.48)	0.97 (0.93 – 1.01)
Divorced and others	0.52 (0.50 – 0.53)	1.11 (1.07 – 1.16)	1.87 (1.77 – 1.97)	0.97 (0.91 – 1.03)
Insurance premium				
Q1	1.00	1.00	1.00	1.00
Q2	1.99 (1.95 – 2.03)	1.04 (1.00 – 1.07)	1.31 (1.25 – 1.37)	1.08 (1.02 – 1.13)
Q3	2.40 (2.36 – 2.44)	0.90 (0.88 – 0.93)	1.08 (1.03 – 1.13)	0.91 (0.87 – 0.96)
Q4	1.64 (1.61 – 1.67)	0.96 (0.93 – 0.99)	1.15 (1.10 – 1.20)	0.95 (0.91 – 0.99)
Charlson comorbidity index	0.94 (0.94 – 0.95)	1.04 (1.04 – 1.05)	0.96 (0.96 – 0.97)	0.87 (0.87 – 0.88)
Urbanization of residence				
High	1.00	1.00	1.00	1.00
Medium	1.32 (1.29 – 1.34)	1.08 (1.05 – 1.11)	1.34 (1.28 – 1.40)	1.11 (1.06 – 1.17)
Low	1.60 (1.57 – 1.63)	0.94 (0.91 – 0.97)	1.10 (1.05 – 1.15)	0.87 (0.82 – 0.91)
Year of death				
2014	1.00	1.00	1.00	1.00
2015	0.99 (0.97 – 1.02)	0.95 (0.90 – 1.00)	1.18 (1.08 – 1.28)	0.89 (0.83 – 0.95)
2016	0.90 (0.87 – 0.92)	1.08 (1.03 – 1.14)	1.51 (1.39 – 1.63)	0.93 (0.87 – 1.00)
2017	0.84 (0.82 – 0.87)	1.20 (1.15 – 1.26)	1.60 (1.48 – 1.73)	0.90 (0.84 – 0.97)
2018	0.73 (0.71 – 0.75)	1.15 (1.09 – 1.20)	1.48 (1.37 – 1.61)	0.93 (0.87 – 1.00)
2019	0.69 (0.68 – 0.71)	1.12 (1.07 – 1.18)	1.45 (1.34 – 1.57)	1.00 (0.93 – 1.07)
2020	0.71 (0.69 – 0.73)	1.11 (1.06 – 1.17)	1.52 (1.40 – 1.64)	0.75 (0.70 – 0.81)
2021	0.63 (0.61 – 0.65)	1.04 (0.99 – 1.10)	1.88 (1.74 – 2.03)	0.79 (0.73 – 0.85)

2022	0.66 (0.64 – 0.68)	1.03 (0.98 – 1.08)	1.82 (1.69 – 1.96)	0.77 (0.71 – 0.83)
2023	0.61 (0.60 – 0.63)	1.08 (1.03 – 1.14)	1.88 (1.75 – 2.03)	0.81 (0.75 – 0.87)
Healthcare input per 10000 population				
No. of hospital beds	1.01 (1.01 – 1.01)	1.01 (1.01 – 1.02)	1.01 (1.01 – 1.01)	1.00 (0.99 – 1.00)
No. of ICU beds	1.08 (1.07 – 1.10)	0.94 (0.92 – 0.97)	0.85 (0.82 – 0.88)	1.28 (1.23 – 1.33)
No. of physicians	0.98 (0.98 – 0.98)	0.99 (0.99 – 0.99)	1.01 (1.01 – 1.01)	0.98 (0.97 – 0.98)

^a To estimate the effect of inpatient palliative care utilization on other places of death, we conducted an additional multinomial logistic regression model without deaths occurring in inpatient palliative care units.

^b To examine dose–response associations, we conducted additional multinomial logistic regression models for patients who received home care services (N = 54,327) in which the number of physician and nurse home visits were modelled as continuous variables (number of visits).

Figure S1. Sampling flow diagram

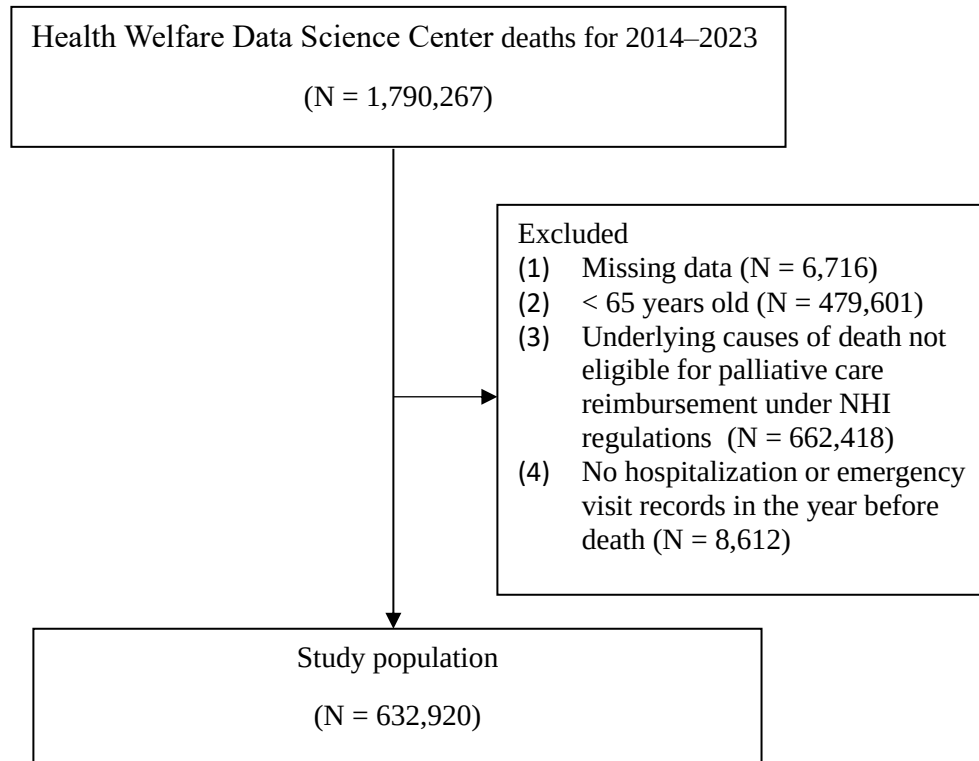


Figure S2. Distribution of place of death among participants (N = 632,920)

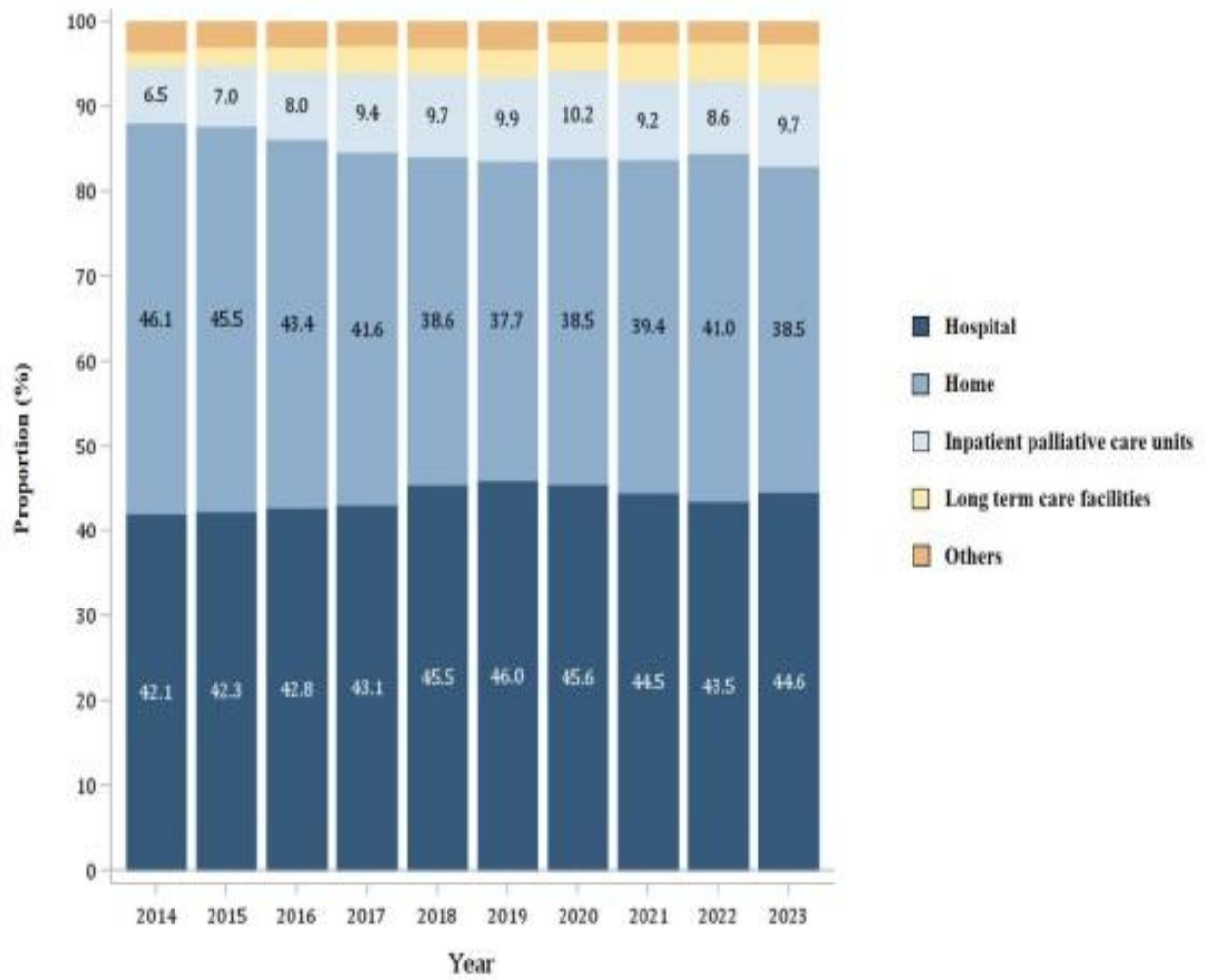


Figure S3. Distribution of place of death among decedents with cancer and non-cancer diagnosis

