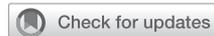


Original Article

A Life or “Good Death” Situation? A Worldwide Ecological Study of the National Contexts of Countries That Have and Have Not Implemented Palliative Care



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Abstract

Context. Palliative care advocates argue that service implementation is feasible in all settings. Yet, services have developed patchily in low- and middle-income settings. Beyond Human Development Index indicators, there has been limited engagement with the broader development challenges facing nations tasked with implementing palliative care.

Objective. The objective of this study was to describe how indicators of national development relate to levels of palliative care services in 207 countries around the world.

Methods. We conducted an ecological study to identify relationships between potential predictor variables and the level of national palliative care development. A total of 28 predictor variables from the following six domains were selected using hypothesized relationships with levels of palliative care development: disease demographics, socioeconomic, health systems, politics, demographics, and economics. The outcome variable was level of national palliative care development on a six-point scale. Spearman's correlation was used to measure the strength of the association.

Results. Twenty-six of 28 variables were statistically significantly associated with levels of palliative care development in 207 countries. Palliative care is more developed in countries with high—percentage of deaths from noncommunicable disease, population proportion aged 65+ years, gross national income, and tourism. Development is lower in countries with high levels of political corruption, infant mortality, deaths by infectious diseases, and weak democracy. Prevalence of undernourishment and levels of private health expenditure were not significantly associated with palliative care development.

Conclusion. Palliative care development is highly consistent with broader national development indicators. It is less in countries where sudden deaths are more likely and benefits from palliative care provision are likely to be very limited. In such countries, resources may be prioritized toward life-prolonging therapies and key aspects of palliative care need only be implemented before fully integrated palliative services. Findings suggest that there may be a “tipping point” in societies, where the relative need for life-prolonging therapies becomes less than the need for integrated palliative care services. *J Pain Symptom Manage* 2019;57:793–801. *Crown Copyright* © 2018 *Published by Elsevier Inc. on behalf of American Academy of Hospice and Palliative Medicine. All rights reserved.*

Key Words

Palliative care, global health, ecological study, sustainable development goals, international development, health systems

Context

The first modern palliative care services emerged in Europe and North America in the 1960s.¹ Since

then, the philosophy and practice of palliative care has been spread and services now exist in 136 of the world's 234 countries.² This represents an

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exponential spread of palliative care practice, since its modern conceptualization. Palliative care advocates argue that service implementation is feasible in all settings.

Yet, services have developed inconsistently in low- and middle-income settings, and inadequate access to palliative care remains a global norm. The authors of the only global mapping study attribute global development to a wide range of qualitative factors (Table 1). They also report that palliative care development is associated with Human Development Ranking.² However, these findings do not inform us about the broader development challenges facing nations who have not implemented palliative care or have done so to a very limited extent.

National governments are now tasked with implementing the World Health Assembly Palliative Care Resolution which states that palliative care should be integrated at all levels of health systems.³ This is at the same time when governments make efforts toward achieving the Sustainable Development Goals, with many of these goals already behind schedule.⁴ With limited finances available, policymakers must make decisions regarding where resources should be allocated. It is therefore important to understand the broad development challenges facing countries tasked with implementing palliative care. Only then can sensible recommendations be made regarding how palliative care can be implemented in health systems worldwide.

We aimed to describe how indicators of national development relate to levels of palliative care services in nations around the world.

Methods

We conducted a cross-sectional ecological study to explore relationships between a range of demographic, health, economic, and political variables and levels of palliative care development in 207 countries.

Data Sources

We used the Worldwide Palliative Care Alliance (WPCA) 2011 global rankings as the outcome variable

for levels of palliative care development. A global update of the WPCA project was published in 2014; however, this did not include new country rankings. An update to the country rankings is planned for 2019, and future comparative analysis of the 2011 and 2019 data is encouraged.

Predictor variables extracted were drawn from several globally collated macro data sets available in the public domain: the World Bank Development Indicators,⁵ the Economist Intelligence Unit,⁶ the Pain and Policy Studies Group,⁷ and Transparency International.⁸ Within such data sets, data are collected on variable years, from heterogeneous sources, and collated by global agencies. All data were extracted in 2014.

Variable Selection

We adapted the WPCA country categorizations of palliative care development into a six-point ordinal scale as the outcome variable (one is lowest and six is highest). Predictor variables were selected using a theoretical approach, based on World Health Organization's guidance on a public health approach to palliative care development⁹ and Global Social Policy perspectives.¹⁰

Predictor variables were selected iteratively, based on theoretical hypotheses that they may be relevant to palliative care development. The justifications for variables included are presented as [Supplementary Appendix 1](#) along with explanation of rankings where appropriate; for example, a low Corruption Index Score indicates high levels of corruption. In total, 28 variables from six domains were included (Table 2).

Data Cleaning

The WPCA study uses United Nations country classifications and provides palliative care rankings for 234 countries. However, the World Bank uses a different country classification approach and publishes data for 207 countries only. As such, countries with a WPCA ranking but no World Bank Data available were removed from the analysis. As shown in [Table 3](#), the proportion classified by each palliative

Table 1
Factors Influencing the Development of Palliative Care Services

The Emergence of Palliative Care Champions	Support From Volunteers
A desire to provide better care for the dying	Good patient and family experiences
Freedom from pain being viewed as a human right	Better access to education and training
The growing awareness of new possibilities	Strategic planning and implementation
The practical needs of an aging population	Changes to the laws governing opioids
A changing political climate (within the Council of Europe for example)	Leadership initiatives are having an effect on policymakers
Advocacy has become sharply focused	Improved communications give easier access to information
Funding has become available	Broader support networks are becoming established

Table 2
Variables Selected With a Hypothesized Relationship With Palliative Care Development

Theoretical Domain	Predictor Variable
Burden of disease	Cause of death, by noncommunicable diseases (% of total)
	Cause of death, by communicable diseases (% of total)
Country demographics	Population ages 65 yrs and above (% of total)
	Mortality rate, infant (per 1000 live births)
	Urban population (% of total)
	Birth rate, crude (per 1000 people)
	Mortality rate, adult, male (per 1000 male adults)
	Mortality rate, adult, female (per 1000 female adults)
Socioeconomic	Population growth (annual %)
	Life expectancy at birth, total (yrs)
	Age dependency ratio (% of working-age population)
	GNI per capita (constant 2005 US\$)
	Literacy rate, adult total (% of people ages 15 yrs and above)
	Net ODA received per capita (current US\$)
	Out-of-pocket health expenditure (% of total expenditure on health)
	Death rate, crude (per 1000 people)
	Prevalence of undernourishment (% of population)
	GINI index
	International tourism, number of arrivals
	Internet users (per 100 people)
	Consumption of morphine equivalent in mg per capita
Health systems	Hospital beds (per 1000 people)
	Health system ranking
	Health expenditure, public (% of GDP)
Political context	Health expenditure, private (% of GDP)
	Corruption index
	Public spending on education, total (% of GDP)
	Strength of democracy

ODA = Overseas Development Assistance.

care variable was not unduly altered by using the World Bank compared with the WPCA grouping.

Available data from macro data sets were imported into SPSS IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY). As predictor variable data are not published annually

by global organizations, a five-year period (2007–2011) preceding the outcome variable (2011) was agreed among the research team as a reasonable time frame within which to explore associations between variables. An exception to this rule was made to include disease and health system data from 2000 as this was the only

Table 3
Distribution of Countries Within Country Classification Groups

Palliative Care Variable	Frequency (%) (<i>n</i> = 234) Using WPCA Classification	Total Removed From Classification Group (%)	Frequency Using World Bank Classification (<i>n</i> = 207)	Difference in Proportion of Countries Represented
1: No known hospice-palliative care activity	75 (32%)	17 (23%)	58 (28%)	-4
2: Capacity building activity	23 (10%)	4 (17%)	19 (9%)	-1
3: Isolated palliative care provision	74 (32%)	6 (8%)	68 (33%)	+1
4: Generalized palliative care provision	17 (7%)	0 (0%)	17 (8%)	+1
5: Countries where hospice-palliative care services are at a stage of preliminary integration into mainstream service provision	25 (11%)	0 (0%)	25 (12%)	+1
6: Countries where hospice-palliative care services are at a stage of advanced integration into mainstream service provision	20 (9%)	0 (0%)	20 (10%)	+1

WPCA = Worldwide Palliative Care Alliance.

suitable data set usable before 2011. Available data were consolidated and matched to countries.

There were missing data for all variables (Supplementary Appendix 1). Where data were missing for predictor variables, cases were excluded from the analysis. This process was documented, listing the years of data included for each country as well as the total number of countries included within each correlation test.

Following data cleaning, 28 predictor variables and 207 countries with outcome data were included in the analysis.

Analysis

Spearman's correlation was calculated to measure the strength of association between development variables and level of palliative care development.¹¹ We described the strength of association between variables using Cohen's coefficient scale, ranging from zero to perfect.¹² The significance level was set at 5%.

We explored the possibility of conducting ordinal regression to examine predictor variables together; however, this was not attempted for three reasons. First, we ran collinearity diagnostics in SPSS and found high levels of collinearity, meaning that dependent variables would not independently predict the outcome variable.¹³ Second, there was no "proportional odds" between categories of the independent variable, that is, the degree of difficulty of moving between country groups is not equivalent. Finally, it does not improve the overall narrative of the study to isolate fewer variables of particular statistical importance for palliative care development, when no causal relationships can be inferred. Our findings should therefore be understood as exploratory, and no predictive relationships between variables are inferred.

Results

A total of 26 out of 28 variables were significantly associated with levels of palliative care development (Table 4). Results show that theory-driven hypothesized relationships are highly explanatory of palliative care development. Our study provides data to show that palliative care is underdeveloped in countries that face significant broader development challenges and that palliative care provision increases as these broader challenges reduce or change.

The six variables with the strongest relationship to palliative care are presented in Figure 1, and the direction of each relationship between the variables supports the hypothesized reasons for inclusion. Only "prevalence of undernourishment (% of population)" and "health expenditure, private (% of GDP)" were

not significantly associated with palliative care development.

Palliative care is more developed in countries with high—percentage of deaths from noncommunicable disease, population proportion aged 65+ years, gross national income, and tourism. Development appears to be responsive to the needs of aging populations, with level of development higher in countries with high life expectancy and percentage of population aged over 65 years. The strong relationship between palliative care development and tourism supports studies which show that tourism can promote health within host low- and middle-income countries as well as the likelihood of high tourism rates in high-income countries.¹⁴ Higher development in countries with predominantly urban populations supports research identifying the logistical challenges of providing services to rural populations.¹⁵ Higher levels of development in countries with a high percentage of death rates from noncommunicable diseases perhaps reflect the early development of palliative care as an end-of-life cancer intervention.

Palliative care is less developed in countries with weak democracy and high levels of—political corruption, infant mortality rates, and deaths by infectious disease. This suggests a lack of political will to establish palliative care services in contexts where most people die at a younger age from infectious disease and where deaths are more likely to occur after a short period of illness. Such countries may be focusing resources on tackling infectious diseases (where solutions are less complex than to tackling noncommunicable diseases) at the expense of palliative care.¹⁶

Countries with no or limited palliative care provision are also associated with low overall health system strength, high mortality rates at younger ages, and high levels of societal inequality. These findings support the overall understanding that countries with limited palliative care services face significant structural problems in the delivery of any form of social welfare. Such countries are also likely to be net receivers of Overseas Development Assistance, which supports suggestions that global funding agencies are not promoting palliative care as a key aspect of international development.¹⁷

Finally, outlier countries were found across all included variables. Most notably, Uganda and Romania both appear as outliers across several variables, with high levels of palliative care development in the context of significant broader development challenges. Another particularly noticeable outlier was "Monaco," with "no known palliative care activity" in the context of having the highest ratio of hospital beds per 1000 in the world and known wealth and prosperity. These findings encourage renewed attention on how services in Uganda and Romania have

Table 4
Associations Between Demographic, Social, Economic, Health, and Political Variables and Levels of Palliative Care Development¹²

Domain	Predictor Variables	Correlation Coefficient	Relationship Strength ^a (Cohen)	P-value
Burden of disease	Cause of death, by noncommunicable diseases (% of total)	0.536	Strong	<0.001
	Cause of death, by communicable diseases (% of total)	-0.481	Moderate	<0.001
Socioeconomics	Life expectancy at birth, total (yrs)	0.445	Moderate	<0.001
	Age dependency ratio (% of working-age population)	-0.324	Moderate	<0.001
	Literacy rate, adult total (% of people ages 15 and above)	0.272	Weak	0.001
	Out-of-pocket health expenditure (% of total expenditure on health)	-0.158	Weak	0.031
	Death rate, crude (per 1000 people)	0.152	Weak	0.032
	Prevalence of undernourishment (% of population)	-0.049	Weak	0.591
	GINI index (low score = high income equality)	-0.259	Weak	0.001
	International tourism, number of arrivals	0.689	Strong	<0.001
Health systems	Internet users (per 100 people)	0.471	Moderate	<0.001
	Consumption of morphine equivalent in mg per capita	0.587	Moderate	<0.001
	Hospital beds (per 1000 people)	0.301	Moderate	<0.001
	Health system ranking (1 = highest possible ranking)	-0.418	Moderate	<0.001
Political	Health expenditure, public (% of GDP)	0.362	Moderate	<0.001
	Health expenditure, private (% of GDP)	0.129	Weak	0.078
	Corruption index (low score = high corruption)	0.570	Strong	<0.001
	Public spending on education, total (% of GDP)	0.182	Weak	0.025
Demographic	Strength of democracy (high score = strong democracy)	0.618	Strong	<0.001
	Proportion of population aged ≥65	0.524	Strong	<0.001
	Mortality rate, infant (per 1000 live births)	-0.499	Moderate	<0.001
	Urban population (% of total)	0.320	Moderate	<0.001
	Birth rate, crude (per 1000 people)	-0.447	Moderate	<0.001
	Mortality rate, adult, male (per 1000 male adults)	-0.346	Moderate	<0.001
	Mortality rate, adult, female (per 1000 female adults)	-0.448	Moderate	<0.001
Economic	Population growth (annual %)	-0.218	Weak	<0.002
	GNI per capita (constant 2005 US\$)	0.595	Strong	<0.001
	Net ODA received per capita (current US\$)	-0.376	Moderate	<0.001

^a0 zero, 0 < r ≤ 0.3 weak, 0.3 < r ≤ 0.5 moderate, 0.5 < r ≤ 0.9 strong, 0.9 < r ≤ 1 very strong, 1 perfect.

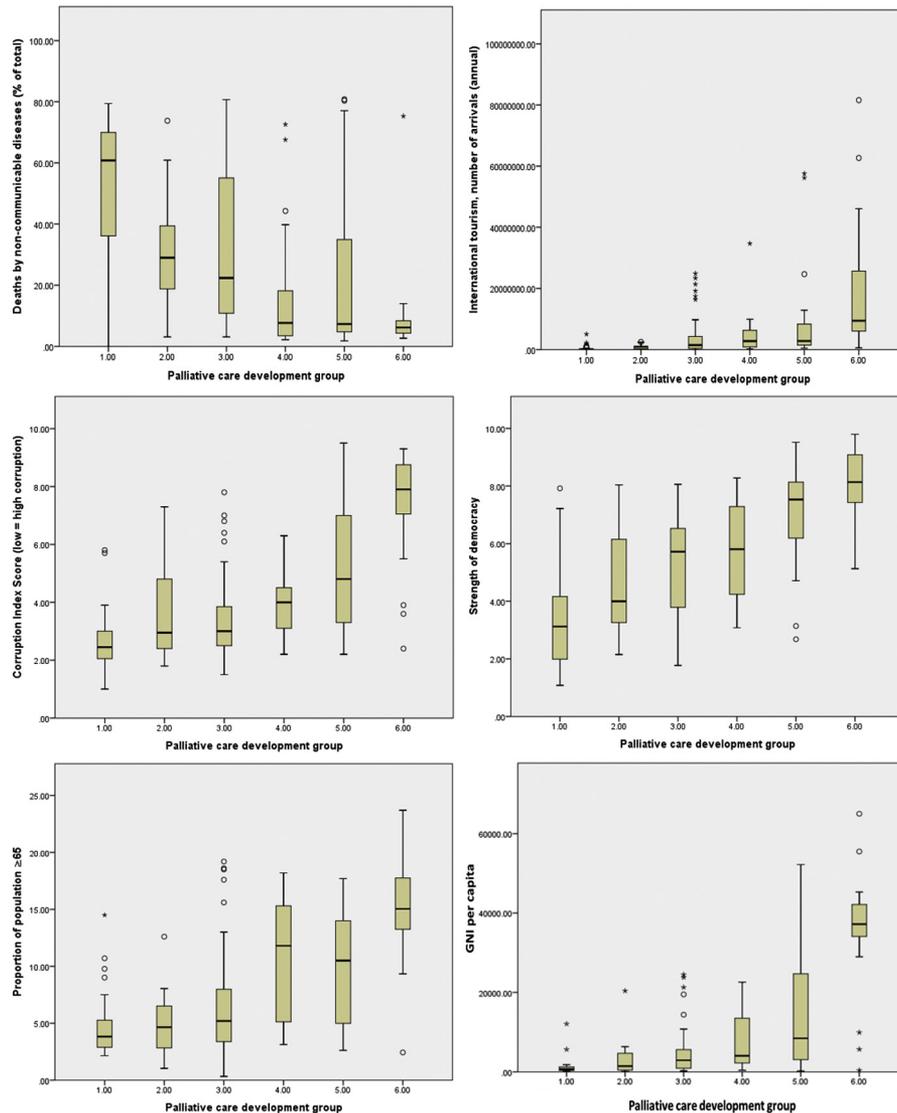


Fig. 1. Predictor variables with the strongest relationship with palliative care development ($n = 6$).

developed to a high level in spite of challenging circumstances. However, other outlier countries encourage caution about the validity of some country rankings, given the unexpected and unlikely finding of Monaco as a place without any palliative care at all.

Discussion

This exploratory study provides data to show that international palliative care development is highly consistent with broader national development indicators. Our findings support an overall understanding that countries that have limited palliative care services face significant structural problems in the wider delivery of social welfare, with a particular challenge being high levels of corruption and weak democracy, which have undermined the development of high quality

health services. In such circumstances, millions of people continue to die from diseases of poverty (e.g., diarrhea), which are either treatable or preventable in the first place.¹⁸

A Life or “Good Death” Situation?

In countries where most deaths are still caused by communicable diseases, the dying process is more likely to be relatively brief (while noting that some communicable diseases such as HIV are increasingly of chronic course).¹⁹ This means that most need for palliative care will occur suddenly, in response to “unexpected” end to life, and not for progressive illness. This limits the benefits that may accrue from the provision of palliative care. In countries where most deaths are caused by noncommunicable diseases, improved life expectancies have come with the associated challenges of increased prevalence of illnesses of

old age and chronic complex. In such circumstances, the dying process is likely to be prolonged, with patients living with serious illness and associated problems for a significant period of months to years. This increases the overall need for palliative care and the value proposition which services may represent.

Our analysis suggests that palliative care services are developing to a high level in such circumstances and that development occurs in response to increased longevity of need, relative to other health concerns. It also suggests that there may be a societal “tipping point,” where health care priorities switch from delivery of life-extending therapies (plus basic elements of palliative care) to services aimed at ensuring quality of life as a public health priority—with ongoing appropriate curative services. Societies must plan for when any “switch” must take place and not repeat the mistakes of many health systems in richer countries, where success of acute care provision has often developed into delivery of expensive and futile treatments at the end of life. This has come at the expense of delivery of appropriate supportive and palliative care measures, in particular for those with nonmalignant disease.²⁰

What then are the consequences for the feasibility of implementing the WHA Resolution in all settings?

A key argument for the feasibility of palliative care is that implementation may be cost-saving to health systems.²¹ By reducing use of expensive “futile” curative treatments in advanced disease, costs may be saved by appropriately directing patients toward palliative care. However, in countries where palliative care services have not developed, it must be acknowledged that rolling out new palliative care services will be an additional cost to already burdened health care systems that are struggling to provide vaccinations for preventable disease and inexpensive curative treatments for otherwise fatal illnesses that are rarely fatal in high-income countries.²²

This is in spite of the potential for palliative care to cost-effective through the reduction of costly ineffective therapies.²³ Overtreatment of medical problems is a present and growing problem around the world, and great inequalities and inequities exist between (and within) nations in terms of access to appropriate care.²⁴ However, undertreatment and lack of access to the most fundamental appropriate health care remains the dominant reality for most people in low- and middle-income countries. Although a key tenet of palliative care is to accept death as a natural process, this does not mean that we should not intervene where the lives of otherwise healthy people may be saved by simple, inexpensive, and appropriate medical treatment.

Within this context, calls for accelerated development of palliative services must be informed by in-depth understanding of national development

contexts, local needs, and opportunity costs. It is important that priority palliative interventions are available to those who need them. This raises the need for research to illuminate what the priority issues are for dying patients in all world contexts. While not forgetting holistic approaches to palliative care, development should focus on “key issues” for patients, before fully integrated palliative services. Alongside this, health care systems in low- and middle-income countries must continue to strive to reduce deaths from avoidable and treatable causes.

Limitations

The nonuniformity of methods used to collect national-level data and consequent heterogeneity of data means that the validity of conclusions of this study must be treated with caution. Furthermore, the WPCA rankings themselves are problematic, given that they are commonly based on self-reported data and researcher judgments. Some data were also missing for all variables. This means that some countries were excluded (Table 3), which introduces a small but systematic bias, with richer countries overrepresented. In spite of these limitations, our results are based on “comparable cases,” derived from a single outcome variable. As with all ecological studies, there is an inherent risk of “ecological fallacy.” We acknowledge that by using “country” as the unit of analysis, our results may not reflect the experiences of individuals or inequities within such countries given that health funding and palliative care policies may be at a subnational level. Nevertheless, our observational study illuminates understanding of the broader national problems and challenges facing countries that are yet to implement palliative care to a high level and provokes debate about the future development of palliative care.

Finally, our cross-sectional study offers a snapshot of the global situation in 2014. Since data were collated, there have been numerous global developments, including efforts to implement the 2014 Palliative Care Resolution and the Sustainable Development Goals. In spite of challenges, such policy developments as well as ongoing improvement efforts will have no doubt on improved palliative care development within countries. For example, palliative care has been included as an important part of the National Cancer Control Program in Afghanistan, a country with previously “no known palliative care activity”—immediately altering its country ranking.²⁵ There may also have been setbacks to national development in some countries around the world. Publication of new country rankings will facilitate comparative research to improve understanding of how national development contexts interact with palliative care development.²⁶ Further work may also investigate how national indicators of development interact with palliative care development

to test emerging hypotheses. For example, do high levels of arriving tourists indeed promote palliative care development in nations and what are the consequences of this?

Conclusion

Our findings suggest that there may be a “tipping point,” where the relative need for life-prolonging therapies becomes less than the need for integrated palliative care services. Future research could usefully focus on how to identify any such tipping point in specific national contexts. This would allow appropriate preparation for new challenges of aging populations, associated increases in chronic/degenerative illnesses, and survivorship, when basic interventions to prevent and avoid deaths from avoidable causes have been successfully implemented.

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Appendix

Supplementary Appendix 1

Rationale for Variable Inclusion and Included Data Levels

No.	Indicator	Domain	Description	Year of Data	Measure	Records Included	Theoretical Relationship with Palliative Care Development
1	Cause of death, by noncommunicable diseases (NCDs) (% of total)	Burden of disease	Percentage of national population who die due to noncommunicable illness. ¹	2000	Scale	171 records	There has been a historical association between palliative care and cancer (a noncommunicable disease). ² Although palliative care is now recommended for both noncommunicable and communicable diseases, inclusion of this variable allows an investigation regarding whether palliative care has developed primarily to meet the needs of cancer patients.
2	Cause of death, by communicable diseases (% of total)	Burden of disease	Percentage of deaths resulting from communicable diseases and maternal, prenatal, and nutrition conditions. ³	2000	Scale	172 records	The WHO recommends palliative care for any life-limiting illness. However, as palliative care emerged originally to meet the needs of cancer patients, the inclusion of this indicator allows assessment of whether palliative care services have now developed in countries where people predominantly die for infectious illnesses.
3	Life expectancy at birth, total (yrs)	Socioeconomic	Expected life expectancy for a new born based on assumed continuation of current mortality rates. ⁴	2011, 2010	Scale	195 records	Life expectancy is considered a key indicator of development as well as a major inequality between nations. ⁵ Disaggregating life expectancy from the other components of human development score is appropriate in context of the global challenge of aging populations. Inclusion of this variable allows examination of WPCA claims that palliative care has developed “to meet the needs of aging populations.”
4	Age dependency ratio (% of working-age population)	Socioeconomic	Ratio of older dependents, people older than 64 yrs to the working-age population, those ages 15–64 yrs ⁶	2011	Scale	190 records	This indicator is central to discourses around aging and the sustainability of health systems. Its inclusion allows investigation of whether palliative care has developed most highly, in circumstances where fewer people (older or younger) are paying into health systems.

5	Literacy rate, adult total (% of people ages 15 and above)	Socioeconomic	Percentage of adults (15+) who can read, write, and possess basic numeracy. ⁷	2011, 2010, 2009, 2008, 2007	Scale	136 records	Literacy rates is one of the social indicators used as a contextual factor for why the Indian state of Kerala has achieved high palliative care coverage. ⁸ Such links provide justification for examining any relationship between literacy rates and level of palliative care development. It may be expected that higher literacy rates are indicative of higher levels of palliative care development.
6	Out-of-pocket health expenditure (% of total expenditure on health)	Socioeconomic	Any direct household outlay spent on restoration or enhancement of health. ⁹	2011	Scale	187 records	This variable allows distinction between public and private health systems. Theoretically, lower out-of-pocket expenditure is indicative of high commitment from governments to health care. ¹⁰ Conversely, greater out-of-pocket expenditure is suggestive of a greater role of the private sector in the provision of health care. Understanding palliative care development from a public health approach, it may be expected that out-of-pocket expenditure would be lower in circumstances which have higher levels of palliative care development.
7	Death rate, crude (per 1000 people)	Socioeconomic	Total deaths per year per 1000 people ¹¹	2011, 2010, 2007	Scale	199 records	Crude death rates indicate the number of deaths during the year per 1000 population estimated at midyear ¹² and serves as an estimate of the prevalence of death within a population. Estimating death rates is important in terms of assessing potential need for palliative care services. Competing hypotheses are firstly, that high death rates indicate greater need for palliative care and that palliative care may have developed to meet this need. Alternatively, it could be suggested that higher death rates are indicative of underdeveloped health systems where palliative services may not yet have emerged to meet palliative care need.

(Continued)

Supplementary Appendix 1
Continued

No.	Indicator	Domain	Description	Year of Data	Measure	Records Included	Theoretical Relationship with Palliative Care Development
8	Prevalence of undernourishment (% of population)	Socioeconomic	Percentage of population below minimum level of dietary energy consumption ¹³	2011	Scale	125 records	Tackling undernourishment can be considered a global health priority in line with MDG 1: to eradicate extreme poverty and hunger. ¹⁴ The line of enquiry here is that countries where undernourishment remains prevalent are less likely to have developed the infrastructure for palliative care.
9	GINI index	Socioeconomic	Extent to which income distribution or consumption expenditure among individuals or households within a nation deviates from a perfectly equal distribution. ¹⁵	2011, 2010, 2009, 2008, 2007	Scale	152 records	The GINI coefficient is a measurement of the level of income inequality and consumption expenditure within a country. A GINI index of 0 indicates perfect equality, whereas an index of 100 suggests perfect inequality. ¹⁶ One theoretical hypothesis for including the variable is that it can be suggested that income equality (or inequality) is not something that occurs naturally, but which is guided by policies. ¹⁷ One hypothesis is that more equal societies enjoy greater social cohesions, a circumstance that may have facilitated the development of palliative care. ¹⁸ An alternative hypothesis was heard anecdotally by the author that high-income inequality in a country can actually facilitate access to palliative care services, as poorer people seek care as they are unable to seek more expensive curative alternatives.
10	International tourism, number of arrivals	Socioeconomic	Total tourist arrivals (under one year) per year ¹⁹	2010, 2008, 2007	Scale	196 records	High levels of international tourism in a country are associated with both positive and negative health outcomes. ²⁰ A theoretical hypothesis is that where large numbers of tourists encounter avoidable suffering—absence of pain relief, for example—that

11	Internet users (per 100 people)	Socioeconomic	Individual users of the Internet per year (per 100 people) ²¹	2011	Scale	202 records	<p>this leads to a response. The work of Ecosphere, a tourism social enterprise, which is helping to introduce palliative care into an isolated Himalayan region in India (Himachal Pradesh) fits with this theory and provides justification to examine any potential broader trends.</p> <p>The WPCA reported growing awareness of new possibilities, better access to education and training, improved communication systems, access to information as well as “broader support networks” as factors driving palliative care development. “Internet use” was deemed to be a reasonable indicator of access to such systems and processes and was therefore included as a facilitator of such factors on that basis. It may therefore be expected that higher Internet use is associated with higher levels of palliative care development.</p>
12	Consumption of morphine equivalent in mg per capita	Health systems	Total opioids distributed to licensed dispensaries (per capita) ²²	2010	Scale	154 records	<p>Opioid consumption is sometimes referred to as the only indicator collated at global level which is relevant to palliative care provision. Morphine equivalents (MEs) serve as a good indication of the availability and provision of pain relief within a country, although it does not reveal anything about equity of access in a country. Competing hypotheses are that firstly, availability of morphine equivalents has driven service development. Alternatively, it could be that advocacy from palliative care activists has led to greater ME availability. However, it would be expected that the higher the level of consumption, the higher the level of palliative care development.</p>

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No.	Indicator	Domain	Description	Year of Data	Measure	Records Included	Theoretical Relationship with Palliative Care Development
13	Hospital beds (per 1000 people)	Health systems	Hospital bed available per 1000 people (public and private) ²³	2011, 2010, 2009, 2008, 2007	Scale	167 records	This variable is included as an indicator of countries' health infrastructure. The measure includes beds at public, private, general, and specialized hospitals and rehabilitation centers. It can be suggested that the higher the proportion of beds to people, the greater the chance that some of these are utilized for palliative patients.
14	Health system ranking	Health systems	Overall health system performance ranking measured in terms of improvement in health, health system responsiveness, and distribution of service ²⁴	2000	Ordinal	187 records	It is argued that palliative care is an important element of health systems strengthening. ²⁵ Therefore, it may be suggested that the stronger the health system is, the more likely that palliative care has developed to a high level.
15	Health expenditure, public (% of GDP)	Political	Public health expenditure as a percentage of Gross Domestic Product ²⁶	2011	Scale	187 records	In general, high public expenditure on health is consistent with social democratic health systems, whereas low spending is associated with liberal health systems. ²⁷ The hypothesis here is that the greater the proportion of government resources that are directed toward health, the higher the level of palliative care development.
16	Health expenditure, private (% of GDP)	Political	Private health expenditure includes direct household) spending, private insurance, charitable donations, and payments by private corporations as a percentage of Gross Domestic Product ²⁸	2011	Scale	187 records	This variable serves as an indication of political ideology, with higher private spending on health associated with liberal health systems and lower spending, when compared to social democratic models. From a public health perspective, it may be expected that lower private health expenditure would be associated with higher palliative care development.
17	Corruption index	Political	Level of misappropriation of health funding for personal gain ²⁹	2011	Ordinal	180 records	Globally speaking, health targets have focused on the reduction of infectious disease. ³⁰ With increased funding, there is

18	Public spending on education, total (% of GDP)	Political	Government spending on education as a percentage of Gross Domestic Product ³²	2011, 2010, 2009, 2008, 2007	Scale	151 records	increased political pressure for these targets to be met. High levels of corruption have seen the misdirection of finances made available for health care. ³¹ Therefore, resources that may have been allocated to palliative care development were not spent on developing palliative services. As there are no global targets relating to palliative care, there is little accountability either. A corruption index score number indicates high levels of corruption
19	Strength of democracy	Political	Composite measure of democracy strength including pluralism, civil liberties and political culture ³³	2011	Ordinal	167 records	This indicator has been included for analysis as a further measure of government commitment to social outcomes among its population. Furthermore, the context of Kerala, where educational indicators are high provides more anecdotal evidence of a potential relationship between these two variables. ⁸
20	Population ages 65 yrs and above (% of total)	Demographic	Percentage of total population aged 65+ yrs ³⁵	2011	Scale	190 records	Inclusion of this variable follows other studies that have found a positive effect of democracy on health. ³⁴ In this regard, it may be expected that palliative care has developed to higher levels within stronger democracies. "The practical needs of an aging population" has been reported as a driver of palliative care development. The needs of people who die before the age of 65 yrs, notwithstanding, including this variable allow us to test the hypothesis that palliative care services have developed to meet the needs of older people (>65).
21	Mortality rate, infant (per 1000 live births)	Demographic	Total deaths of infants under one year of age (per 1000 live births) ³⁶	2011	Scale	190 records	Infant mortality rates are considered a key indicator of health system strength (or weakness). ³⁷ With a health systems approach proposed for palliative care development, it might be expected that high infant mortality rates are an

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No.	Indicator	Domain	Description	Year of Data	Measure	Records Included	Theoretical Relationship with Palliative Care Development
22	Urban population (% of total)	Demographic	People living in urban areas as percentage of total population ³⁸	2011	Scale	207 records	indicator of health system weakness. Global prioritization of improving infant mortality rates may suggest that this is being prioritized over and above rollout of palliative care. The geography and demographics of a country can present unique challenges for health systems to deliver quality health care. In terms of the urban:rural distribution of a population, a major issue centers around access to health services. In addition, a systematic review reports that palliative care services have developed mainly in urban areas. ³⁹ Inclusion of this variable makes it possible to test this claim.
23	Birth rate, crude (per 1000 people)	Demographic	Live births each year per 1000 persons ⁴⁰	2011, 2010, 2007	Scale	201 records	Birth rates have become used as a quasi-indicator of a countries' level of development, with low birth rates prevalent in the countries of high development and higher rates found in lesser developed countries—in particular the world's poorest countries. ⁴¹ The theoretical argument for the inclusion of the variable is that in developmental health systems where countries have not yet tackled issues relating to high infant and maternal mortality, they have not been able to focus on the needs of people at the end of life.
24	Mortality rate, adult, male (per 1000 male adults)	Demographic	Total adult (15–60) male deaths per 1000 adult males ⁴²	2011, 2010, 2009, 2008	Scale	190 records	Mortality rates are included as a useful suggestion of the extent to which palliative care services have developed in response to need. In general terms, proponents suggest that most people would benefit from palliative treatment during the final phase of life—whenever that may be. On this basis, it can

25	Mortality rate, adult, female (per 1000 female adults)	Demographic	Total adult (15–60) female deaths per 1000 adult females ⁴³	2011, 2010, 2009, 2000	Scale	190 records	be suggested that higher mortality rates are indicative of greater level of need within a population and the responsiveness of health systems to palliative care need. Distinction between male and female mortality rates have been drawn to take into consideration potential gender difference. As above
26	Population growth (annual %)	Demographic	Annual population increase as a percentage of total population ⁴⁴	2011 and 2010	Scale	207 records	Generally speaking, growing national populations are associated with low- and middle-income countries and reducing populations, with high-income—and aging—nations. ⁴⁵ The variable has been included as it can be said that there is an increased challenge of rolling out palliative care services to an increasing population. Changing population demographics (growing and reducing) present different challenges to policymakers. However, as palliative care is one recommendation from the United Nations as a policy response to global aging, it can be said that we may expect to find greater palliative care development in countries where the population is reducing.
27	GNI per capita (constant 2005 US\$)	Economic	National income divided by mid-year population ⁴⁶	2011, 2010, 2009, 2008, 2007	Scale	141 records	Gross National Income (GNI) per capita is one element of the composite measure of a country's Human Development score. This variable has been included as it may be suggested that the higher the nations income, the greater the financial resources that are available to have funded palliative care development.
28	Net ODA received per capita (current US\$)	Economic	Net overseas development assistance divided by midyear population ⁴⁷	2011 and 2010	Scale	141 records	Overseas Development Assistance (ODA) is the term coined by the Organization for Economic Co-Operation and Development for the transfer of resources from official agencies

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No.	Indicator	Domain	Description	Year of Data	Measure	Records Included	Theoretical Relationship with Palliative Care Development
							<p>and governments which “is administered with the promotion of economic development and welfare of developing countries.”⁴⁸ Much ODA is channeled to improving health care services of recipient countries. This variable is of interest, as it may be expected that countries are able to provide ODA to have higher levels of palliative care development, yet, through ODA, opportunities may have arisen for lower income nations fund palliative care.</p>

WPCA = Worldwide Palliative Care Alliance.

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