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Patterns of diagnoses amongst children and young adults with Life-Limiting Conditions; a secondary analysis of a national dataset

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Figures 3, Tables 2

Abstract

Background

Numbers of children and young people with Life-Limiting Conditions (LLC) are rising and increasing lifespans require young adults with LLC to transition to appropriate adult services.

Aim

To describe the prevalence of LLC in children and young adults by age, sex, diagnostic group, ethnicity and deprivation.

Design

A secondary analysis of the English Hospital Episode Statistics dataset was undertaken to calculate prevalence per 10000 population.

Setting/Participants

Individuals (0-40 years) with LLCs were identified within an English Hospital Episode Statistics dataset by applying a customized coding framework of ICD-10 disease codes.

Results

There were 462,962 inpatient hospital admissions for 92,129 individual patients with a LLC. Prevalence by age group is U shaped with the highest overall prevalence in the under one year age group (127.3 per 10000), decreasing until age 21-25 years (21.1 per 10000) before rising steeply to reach 55.5 per 10000 in the 36-40 year age group. The distribution by diagnostic group varies by age: congenital anomalies are most prevalent in children until age 16-20 years with oncology diagnoses then becoming the most prevalent.

Conclusions

Non-malignant diagnoses are common in children and young adults and services that have historically focussed on oncological care will need to widen their remit to serve this population of life-limited patients. The diagnosis determining a patient's LLC will strongly influence their palliative care service needs. Therefore understanding the diagnostic and demographic breakdown of this population of teenagers and young adults is crucial for planning future service provision.

Key Statements

What is already known about the topic

The prevalence of children with Life-limiting conditions is increasing, especially in the 16-19 year age group.

What this paper adds

Overall non-malignant diagnoses are more common than oncological ones in all age groups.

Prevalence of LLC is highest in deprived areas throughout the age groups.

There are higher prevalence of LLC in non-white children and young adults.

Implications for practice, theory or policy

Palliative Care services aimed at children and young adults need to take account of the diagnostic and demographic breakdown of this population in order to develop efficient and equitable services.

Background

Recent work has shown that the numbers of children and young people with Life-Limiting Conditions (LLC) and complex chronic conditions are rising^{1,2}. Although the highest prevalence of LLC is in the under one age group, the largest increase over the last ten years is in the 16-19 year olds¹, leading to a large number of young adults who have been cared for by paediatric palliative care services requiring transition to adult services³. Historically, adult palliative care services have tended to care for people with cancer in the end of life phase⁴ whereas paediatric services have tended to care for children and families with non-malignant diagnoses^{5,6} over many years^{7,8}. Recent, figures from England have, however, shown that although 56% of adult patients receiving care from palliative services required care for fewer than 90 days, 45% of adult patients admitted to specialist palliative care inpatient services were discharged home. This has highlighted the non-end of life services that they provide in addition to end of life care⁹. Palliative care for adults, commonly limited by constraints of resources, is often still a service that is offered once any disease directed care has failed in contrast to the paediatric model of care proposed by the World Health Organisation which states that "It begins when illness is diagnosed, and continues regardless of whether or not a child receives treatment directed at the disease."⁹

A recent systematic review of transition in paediatric palliative care found that although some conditions had disease specific transition routes e.g. oncology and cystic fibrosis, many young adults expressed concern at the lack of availability of age appropriate services similar to the care they had received in the paediatric service¹⁰. Young adult uptake of adult specialist palliative care services (SPC) is low with only just over 200 patients aged 16-24 accessing adult community palliative care services in 2011-12, 90 inpatients, 45 day care and 432 receiving hospital support⁹. In the US children and young adults accounted for less than 1% of all admissions to hospices that cared for both children and adults¹¹ mainly due to lack of capacity to care for these patients. It is known that adult SPC providers have concerns over caring for this new and unfamiliar population of young adults and training needs have been established¹².

Planning services for this population of children and young adults can only be undertaken effectively if the clinical and demographic distribution of these patients are known. This study therefore aimed to describe the patterns of diagnoses by age group in children and

young adults with Life-Limiting Conditions in England in order to inform effective and equitable service provision.

Methods

Participants

All individuals aged 0-40 years with a LLC residing in England were identified in the inpatient Hospital Episode Statistics dataset in 2009/10. An ICD-10 coding framework developed for an earlier study was used to identify the patients¹. Patients who were non-resident in England or aged above 40 years at the start of a hospital episode were excluded from the analyses.

Age

The age at the start of the first inpatient hospital episode was used to assign the five year age category for each patient; those patients aged under one year of age were categorised separately as they are known to have the highest prevalence of LLC¹.

Diagnoses

The diagnoses were grouped by main ICD-10 chapter for analysis; oncology, haematology, neurology, metabolic, respiratory, circulatory, gastrointestinal, genitourinary, perinatal, congenital anomaly and other. No attempt was made to prioritise multiple diagnoses for individuals therefore individuals may have more than one life-limiting diagnosis. As oncology diagnoses become more common with increasing age in adults, the results are displayed for the whole population of LLCs and also excluding those patients with an oncology only diagnosis.

Ethnicity

The data for each hospital episode included a code for ethnicity. Individuals with more than one ethnicity were assigned the most commonly reported ethnicity unless the most common ethnicity was 'not known'¹³. This ensured that the same code for an individual's ethnicity was assigned to all episodes (i.e. if coded White in first hospital episode and the second hospital episode but not known in the third hospital episode, they would be counted as White). The 16 census ethnic groups¹⁴ were merged into four super-groups to avoid very small numbers in some groups;

- White (White: British, White: Irish, White: Other White),
- South Asian (Asian or Asian British: Indian, Asian or Asian British: Pakistani, Asian or Asian British: Bangladeshi, Asian or Asian British: Other Asian),
- Black (Black or Black British: Black Caribbean, Black or Black British: Black African, Black or Black British: Other Black) ,
- Chinese & Other ethnic groups (Mixed: White and Black Caribbean, Mixed: White and Black African, Mixed: White and Asian, Mixed: Other Mixed, Chinese and Other Ethnic Group).

Deprivation

An index of multiple deprivation (IMD2007)¹⁵ score was assigned to each individual based upon their Lower Super Output Area (LSOA) of residence. An LSOA is a census geographical area built up of output areas. There are 32,482 LSOAs (2001 Census) in England with a population of between 1000-3000 per LSOA¹⁶. The IMD scores were split into five equal categories based on the scores for the whole of England (20% of the LSOAs in each category) with category 1 being the highest deprivation and category 5 the lowest.

Population at risk data used to calculate prevalence were mid-year estimates by age, sex and ethnic group obtained from ethpop.org.uk.

Analyses

Prevalence and 95% confidence intervals (CIs) per 10 000 population (aged 0-40 years) were calculated overall, by gender, for each age group, by major diagnostic group and for each ethnic group.

Ethics approval was not required for this project as anonymised data was used. Permission from the NHS Information Centre advisory group was given in order to access this data. All data manipulation was undertaken in Microsoft SQL server 2008; statistical analyses were undertaken in Stata version 12 (Stata Corp, College Station, TX).

Results

There were 462,962 inpatient hospital admissions for 92,129 individual patients with a LLC in 2009/10.

Prevalence

There is a U shaped prevalence with the highest overall prevalence of (127.3 per 10000) in the under one age group, decreasing until age 21-25 years before rising steeply to reach 55.5 per 10000 in the 36-40 year age group (Table 1). Excluding patients whose only diagnosis was oncology showed a similar pattern of prevalence but with a less marked rise in the 36-40 year age group (Table 2).

Overall prevalence in males and females are similar (Table 1) but when analysed by age group the prevalence is higher in males than females until the age 21-25 years where females predominate and the gap widens to 60.7 per 10000 female (95%CI 59.5,61.8) and 50.1 per 10000 (95%CI 49.0,51.1) male by age 36-40 years. The gender differences are altered when the prevalence is assessed excluding those with an oncology only diagnosis (Table 2): overall in this group males have significantly higher prevalence compared to females. Again, males have a higher prevalence until age 21-25 years and then the prevalence is not significantly different.

Major Diagnoses

Overall, congenital anomalies have the highest prevalence in children until age 16-20 years when oncology diagnoses becomes the most prevalent, rising steeply in early adulthood to 25.2 per 10000 by age 36-40 years. Neurology diagnoses have the second highest prevalence from age 1-5 years through to the 36-40 year age group when genitourinary diagnoses have a similar prevalence (Figure 1a). There are some differences by gender (data not shown); in males whereby oncology diagnoses do become the most prevalent diagnostic group (18.4 per 10000) in the age 16-20 age group but genitourinary (10.1 per 10000) and circulatory (8.5 per 10000) diagnoses are the second and third most prevalent diagnoses by age 36-40 years. In the female population the diagnostic pattern shows a more marked increase in oncology diagnoses after age 16-20 years with the highest prevalence of 31.6 per 10000 in the oldest age group. Neurology diagnoses have the second highest prevalence in

the oldest age group in females (10.8 per 10000) with genitourinary third with 7.8 per 10000 population.

Ethnicity

The number of patients in each ethnic group was: White 67,467, Black 3,822, South Asian 8,350 and Chinese, Mixed and Other 4,066. Ethnic group was coded as not known for 9.1% of the patients.

Higher prevalences in non-White ethnic groups were most noticeable in the two youngest age groups where prevalence is higher in Black and South Asian children. The differences were less marked in teenagers but a higher prevalence in the Black population was evident in the 30 plus age groups (Figure 2a). When the oncology only diagnoses patients are excluded, these patterns with ethnic groups persist (Figure 2b).

Deprivation

Figure 3a shows that throughout the age groups the prevalence is higher in the most deprived category and in the majority of the age groups a linear association is evident with the lowest prevalence in the least deprived category. The differences between prevalence for the deprivation categories are most evident in the under 5 and over 30 year age groups. When the oncology only diagnoses patients are excluded, these patterns with deprivation categories persist (Figure 3b).

Discussion

The U shaped prevalence pattern of Life-Limiting Conditions with age is informative when planning services as the age when transition would be occurring parallels the lowest prevalence. At this lowest point there are still more than 8000 patients living in England with a LLC who may require access to appropriate palliative care services, but then prevalence rises as age increases, raising the concern that these young people joining the population after the point of transition may find accessing services more difficult.

The gender differences in overall prevalence of LLC in young adults are accounted for by the higher frequency of oncology diagnoses in the female population.

The higher prevalence of some LLCs in ethnic minority groups has been reported previously although they have a lower incidence of most cancers compared to the White population,

they do have poorer survival for some cancers⁹. Whilst it is encouraging that some paediatric services report growing numbers of patients from non-White ethnic groups^{7,17} a recent report focusing on end of life care in adults has shown that ethnic minority groups have lower access to and receipt of palliative and end of life services compared to White British people¹⁸. This report has highlighted the need to involve ethnic minority groups in research and service planning for the future especially since non-White British populations are expected to grow in the next few decades¹⁹. Community engagement was important in the process of gaining understanding and acceptance of the concept of palliative care in the South Asian community in Yorkshire which has resulted in a marked increase in referrals to the local children's hospice⁷.

The linear association between prevalence of LLC and deprivation was expected and confirms previous work in this area¹ although the differences between the deprivation categories are more noticeable in the young children and older adult age groups. The highest prevalence of LLC in the areas of highest deprivation may indicate higher incidence of LLC in areas of high deprivation or this may be the result of the financial burden of having a LLC resulting in families moving to areas of higher deprivation. Further research is required in this area.

The numbers of 16 – 24 years olds accessing adult SPC services is a very small proportion²⁰ of the 15,000 adults of this age living with a LLC. This in part may be explained by the fact that paediatric SPC services often care for the young adult population³ (Children's Hospices had 120 new referrals age 16+ in 2011/12 and 1780 patients in total aged 16+ being cared for) but further research is required to fully explain this discrepancy. This discrepancy is seen also in the US with less than 1% of admission to hospice organizations that care for children and adults were children and young adults¹¹.

Providing a service for patients with conditions which have very different disease trajectories can be challenging. Within the paediatric palliative care setting children with non-oncology diagnoses tend to be cared for by the services for longer periods of time than children with an oncology diagnosis⁷ and this may have implications for young adults. Adult specialist palliative care services in England are caring for an increasing number of patients with non-oncology diagnoses, accounting for 11% of inpatients in 2011/12 compared to 3% in 1997/8²⁰ so developing these services for younger adults should be feasible. However,

adolescents and young adults with LLC do have some unique physical and psychosocial needs^{4, 6} in particular in relation to sexuality and reproduction but also due to reliance on parents and loss of peer interaction due to hospital stays etc. These needs need to be addressed by specialist palliative care services. Peer support is important for these patients²¹ which may be more difficult in the traditional adult palliative care services where the majority of patients are elderly.

Another layer of complexity to consider when developing a palliative care service for young adults is the provision of a service for patients who had a LLC diagnosed in childhood who may have experienced paediatric palliative care services and also patients who have been diagnosed with a Life-Limiting or Life-Threatening Condition as a young adult. The life experience of these two groups are likely to be quite different, and the needs and expectations of these two groups of patients may differ considerably²². Currently transition planning is poor or absent in the majority of cases^{23, 24}. For those transferring from paediatric services it is known that transition programmes are dependent on collaboration between children's and adult services^{25, 26}. Therefore paediatric palliative care services need to be involved in the development of palliative care services for young people with LLC and there is currently a call to start to plan transition with their patients from age 14²⁷.

Limitations

The prevalence estimates rely on correct identification of the individual's diagnosis within the routine administrative dataset, a variable dependent on accurate diagnostic coding. There is no reason to believe that poor quality coding would be different by LLC and therefore would not substantially alter the prevalence estimates. Some patients with a LLC may not have had a hospital admission during this period and therefore our prevalence figures may represent a minimum.

Ethnicity data was missing for 9.1% of the patients within this dataset so depending on whether the missing data was biased by ethnicity, the prevalence of LLC in some of the ethnic subgroups may be higher than estimated in these analyses.

Survival rates for some cancers are now very high and although these patients are categorised as having a LLC only a small proportion will need to access palliative care services. Presenting the results from these analyses including and excluding these patients

allows transparency but importantly the ethnic and deprivation inequalities persist whether the analyses include the patients with only an oncology diagnosis or not.

Conclusions

The prevalence of Life-Limiting Conditions in children and young adults is U shaped with higher prevalence in the under one year and 36-40 year age groups with the lowest prevalence in the 20-25 year age group. In young adults the higher prevalence is accounted for by patients with an oncology diagnosis.

When considering service provision, young adults with LLCs are a distinct population with different needs than children or older adults LLCs. Also patients with oncology diagnoses usually have different needs from a palliative care service than patients with slowly degenerative diseases. Adult SPC services are familiar with the clinical management of cancer generally but may need to look at the specific needs of other non-malignant groups in order to provide an appropriate service²². The higher prevalence in ethnic minority groups revealed in this study also needs addressing. Encouraging young adults in ethnic minority groups to engage with SPC may require a different approach from that applied to older adults. Accessing any healthcare can be more challenging in areas of high deprivation, but particularly so when considering the needs of this vulnerable population, is also important when planning future palliative care services for these populations.

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England

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Table 1 Prevalence of All Life-Limiting Conditions in England in 2009/10 (0-40 years)

<i>All LLC</i>												
	Total				Males				Females			
Age Group	Number of Patients	Prevalence per 10000 population	95% Confidence Intervals		Number of Patients	Prevalence per 10000 population	95% Confidence Intervals		Number of Patients	Prevalence per 10000 population	95% Confidence Intervals	
< 1 year	8508	127.3	124.6	130.0	4820	140.8	136.9	144.8	3673	112.6	109.0	116.2
1-5 years	10943	33.4	32.8	34.1	6208	37.2	36.3	38.1	4734	29.5	28.7	30.4
6-10 years	6973	24.5	24.0	25.1	3878	26.9	26.0	27.7	3094	22.2	21.4	22.9
11-15 years	7199	24.0	23.4	24.5	3928	25.7	24.9	26.5	3270	22.2	21.4	22.9
16-20 years	7521	23.1	22.5	23.6	3926	24.1	23.3	24.8	3595	22.1	21.3	22.8
21-25 years	8090	21.1	20.7	21.6	3974	20.8	20.1	21.4	4115	21.5	20.8	22.2
26-30 years	10300	28.7	28.2	29.3	4698	27.2	26.5	28.0	5602	30.1	29.3	30.9
31-35 years	12690	40.8	40.1	41.5	5677	37.1	36.1	38.0	7013	44.5	43.4	45.5
36-40 years	19905	55.5	54.7	56.2	8797	50.1	49.0	51.1	11103	60.7	59.5	61.8
TOTAL	92129	33.9	33.7	34.1	45906	33.9	33.6	34.2	46199	33.9	33.6	34.2

Table 2 Prevalence of Life-Limiting Conditions Excluding Oncology Only Diagnoses in England in 2009/10 (0-40 years)

<i>Excluding Oncology Only Diagnoses</i>												
	Total				Males				Females			
Age Group	Number of Patients	Prevalence per 10000 population	95% Confidence Intervals		Number of Patients	Prevalence per 10000 population	95% Confidence Intervals		Number of Patients	Prevalence per 10000 population	95% Confidence Intervals	
< 1 year	8395	125.6	122.9	128.3	4764	139.2	135.3	143.1	3616	110.9	107.3	114.5
1-5 years	10466	32.0	31.4	32.6	5944	35.6	34.7	36.5	4521	28.2	27.4	29.0
6-10 years	6537	23.0	22.5	23.6	3647	25.3	24.4	26.1	2890	20.7	19.9	21.4
11-15 years	6556	21.8	21.3	22.4	3587	23.5	22.7	24.2	2968	20.1	19.4	20.9
16-20 years	6439	19.7	19.3	20.2	3355	20.6	19.9	21.3	3084	18.9	18.2	19.6
21-25 years	6247	16.3	15.9	16.7	3075	16.1	15.5	16.6	3172	16.6	16.0	17.2
26-30 years	7229	20.1	19.7	20.6	3397	19.7	19.0	20.4	3832	20.6	19.9	21.2
31-35 years	8427	27.1	26.5	27.7	4021	26.3	25.4	27.1	4406	27.9	27.1	28.8
36-40 years	12524	34.9	34.3	35.5	6204	35.3	34.4	36.2	6318	34.5	33.7	35.4
TOTAL	72820	26.8	26.6	27.0	37994	28.1	27.8	28.3	34807	25.6	25.3	25.8

Figure 1

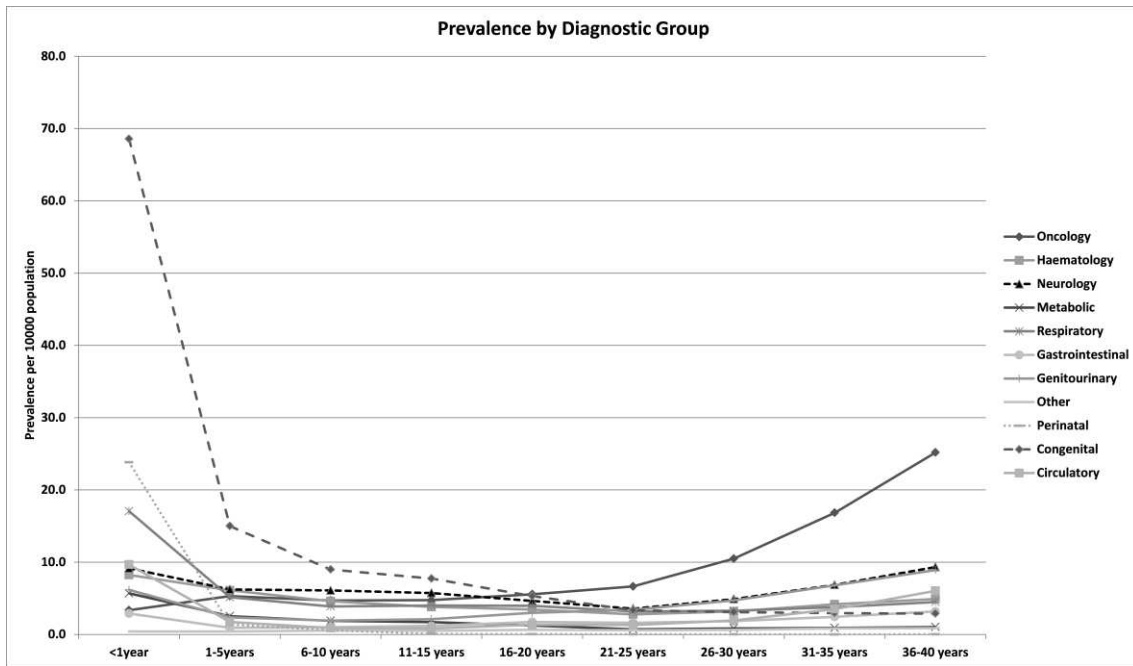


Figure 2a

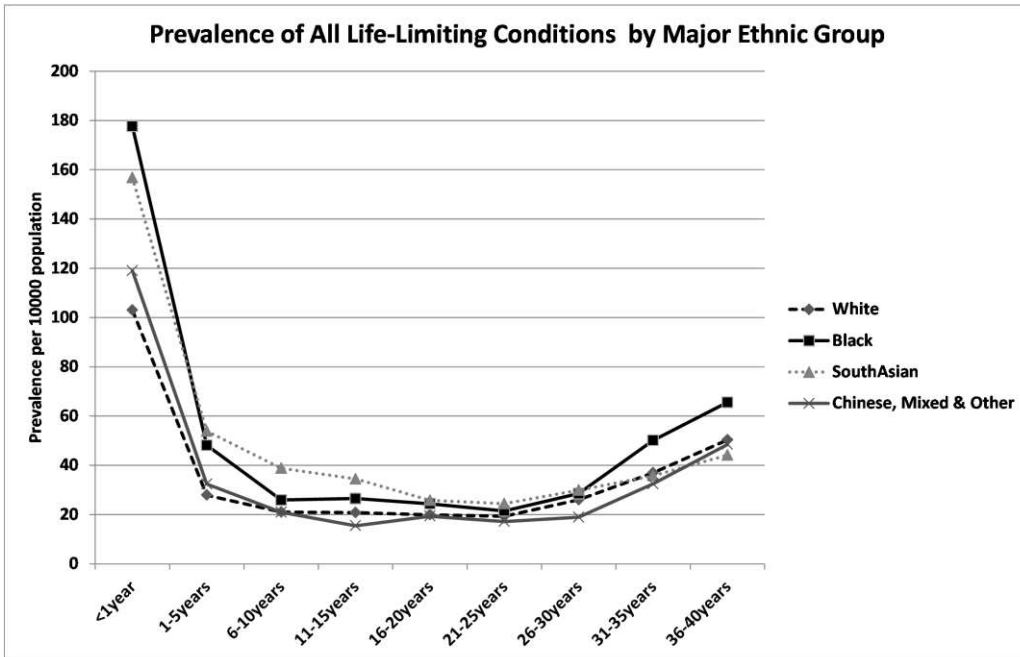


Figure 2b

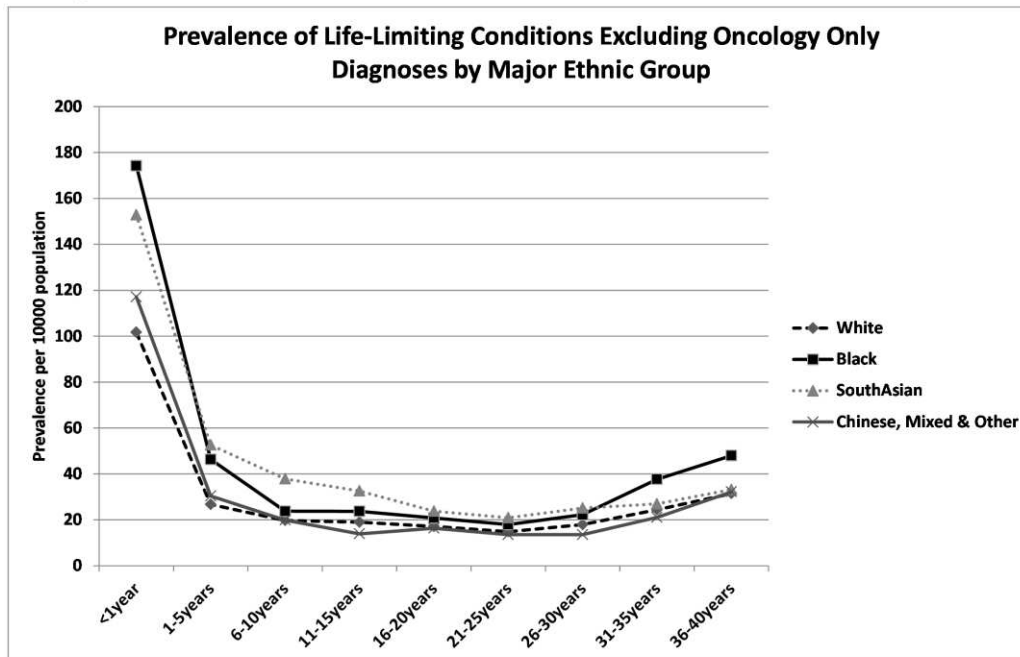


Figure 3a

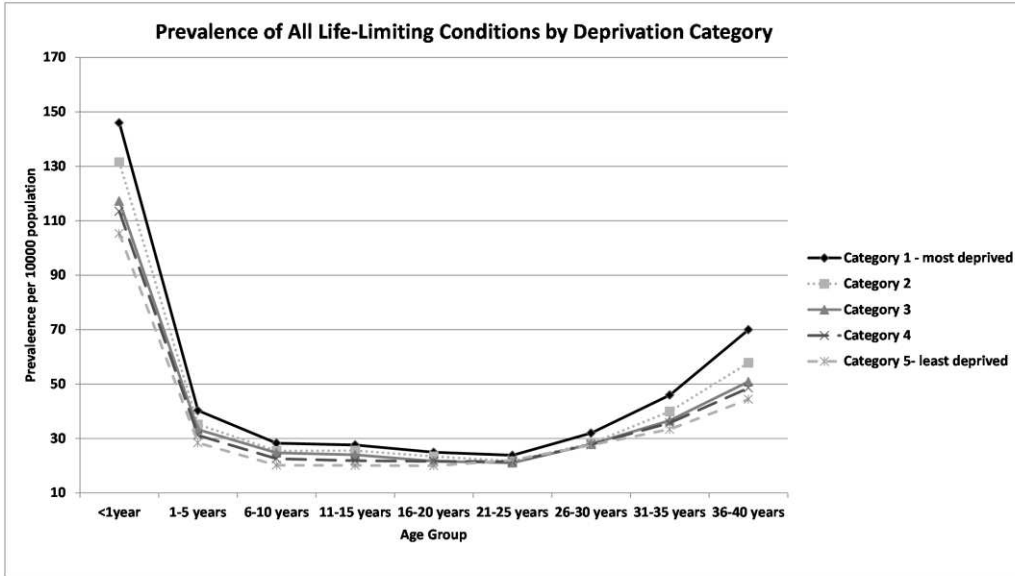


Figure 3b

