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Original Research

Adverse childhood experiences: association with physical and mental health conditions among older adults in Bhutan

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ABSTRACT

Objectives: Adverse childhood experiences (ACEs) are events stressful, traumatic, and related to the development of a wide range of health conditions throughout the person's lifespan. This study explored the relationship between ACEs and health conditions among older adults in Bhutan.
Study design: Cross-sectional survey.
Methods: Older adults aged 60–101 years ($n = 337$) completed a face-to-face interview in a convenient community setting in the four major towns of Bhutan. Measurements included the modified World Health Organization Adverse Childhood Experiences International Questionnaire and the checklist of chronic health conditions.
Results: Commonest ACEs reported by the sample were related to the contribution of physical labour in childhood (n = 284 [84.3%]) and witnessing of community violence (n = 185 [54.9%]). Assuming an adult role while still a child highly co-occur with other forms of ACEs. Compared to 0–2 ACEs, participants with ≥7 ACEs had the higher odds of reporting lung disease (odds ratio [OR] = 2.15, 95% confidence interval [CI]: 1.03–4.49), visual impairment (OR = 2.38, 95%CI: 1.16–4.85), insomnia (OR = 2.35, 95%CI: 1.11–4.98), and memory decline (OR = 2.30, 95%CI: 1.10–4.78) by twofold and high blood pressure by threefold (OR = 3.21, 95%CI: 1.39–7.38). Overall, the odds of self-rated poor health conditions among those ≥7 ACEs compared to 0–2 ACEs was high by almost twofold (OR = 1.97; 95%CI: 1.04–3.73).
Conclusions: The influence of ACEs on health conditions persisted into late adulthood, and older people in Bhutan have had a complex variety of chronic health conditions implicating greater demand on the free healthcare system in Bhutan. ACEs prevention is critical to promote better health for a country like Bhutan, where the healthcare services are provided free of cost to its citizens.

Introduction

Adverse childhood experiences (ACEs) refer to traumatic and frequently occurring events that children suffer early in life.[1] ACEs include multiple types of abuse; neglect; violence between parents or caregivers; serious household dysfunction such as alcohol and substance abuse; peer, community, and collective violence.[1] ACEs are traumatic events that have an effect on the biopsychosocial health across the lifespan of a person.[2]

There is mounting evidence to support the lifetime effects of ACEs on physical and mental health outcomes,[4–8] such as obesity, cardiovascular diseases, cancers, diabetes, depression, and anxiety,[5,9,10] and health-risk behaviours commonly smoking and alcohol abuse.[11] ACEs have dose-response relationship between the levels of exposure to ACEs, physical and mental health outcomes[11–13] and their relationship is complex.[2] Compared to no ACEs, those reporting ≥4 ACEs are two to four times at-risk to report chronic health conditions and poor health status.[8] The mechanism of connection between ACEs and negative health outcomes on later lives is unclear. However, studies on neurobiological changes, sociocognitive and emotional dysfunction, and health-risk behaviours appear to mediate the associations between ACEs and later health problems.[13] Not all trauma heals with time because

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older adults who experienced adversity in childhood had the higher odds of having mood (odds ratio [OR]: 1.73; 95% confidence interval [CI]: 1.32–2.28), anxiety (OR: 1.48; 95%CI: 1.20–1.83), and personality disorders (OR: 2.11; 95%CI: 1.75–2.54).[14]

It is difficult to isolate the impact of a specific trauma related to any single event over a lifetime as adversities often co-occur.[15] According to a study in the Philippines, those who experienced all categories of abuses (physical, psychological, and sexual) also experienced psychological neglect, physical maltreatment, domestic violence, or experience of dysfunctional households.[11]

ACEs appear to negatively impact the socio-economic factors such as educational achievement and employment[6,9,10,16] and low life potentials and premature mortality.[17] Studies have shown gender differences in the rates of exposure to ACEs, observing a higher prevalence in females than males.[9,12,18] Life events and chronic morbidities are common stressors for older people.[19] The extent to which stress contributes to poor health outcome is often difficult to determine. However, the impact of trauma on health varies depending on how a person view the events as threating or challenging.[20] In addition, the pathways to poor health may differ by the types of ACEs.[21] Evidence suggests that exposure to moderate levels of trauma may be associated with better mental health and well-being.[15] Experts believe experiencing low levels of difficulties may teach effective coping skills, perceive situations more positively and manageable. Thereby, fostering the ability to cope successfully, and generate psychophysiological toughness.[15] Childhood adversities present a major public health challenge[3] and a shift to focus on the prevention of ACEs and resilience building is merited.[22]

To date, there is no evidence of a systematic study on the prevalence of ACEs and their influence on health outcomes among older adults in Bhutan. This study was undertaken to assess the prevalence of ACEs and their co-occurrence, and their association with health morbidities. Findings from the study would be useful in advocating the need for greater investments to reduce ACEs, design effective measures and services to improve the health and well-being of the older adults in Bhutan.

Methods

Research design

This study used a cross-sectional survey design. Data were collected between November 2014 and January 2015 by the principal researcher and trained research assistants (RAs).

Study sites and sampling scheme

Because of lack of ACEs research in Bhutan, no 'typical' sample size could be used. Therefore, the sample size was estimated based on the number of variables used in this study.[23] With an approximation of 25 variables included for this study, the final sample was determined at n = 337, which is statistically a valid sample. A non-random convenience sampling was used to recruit eligible participants (60 years and older) in stupas, temples, towns, public parks, and food markets in four regions of Bhutan (Thimphu, Phuntsholing, Gelephu, and Samdrup Jongkhar). Older adults in Bhutan use these places for social interactions. The recruited participants were able to communicate in any of the four main languages (Dzongkha, English, Tshanglakha, and Lhotshamkha), had no sign or symptoms of cognitive or hearing impairment, and were not admitted to any institutions qualified for the study.

Instrumentation

World Health Organization Adverse Childhood Experiences International Questionnaire and the adjusted version of the general health checklist to assess the status of physical and mental health conditions were used. Thirteen different ACEs were included to assess adversities during childhood (Table 1). The instrument was pretested and showed satisfactory internal consistencies for a general health condition (Cronbach's alpha 0.71).

Data collection and techniques

A total of six (four males and two females) final year nursing students from the Faculty of Nursing and Public Health, Khesar Gyalpo University of Medical Sciences of Bhutan, were recruited and trained as RAs. All the RAs were fluent in English, Dzongkha, Lhotshamkha, and Tshanglakha languages and employed for data collection in this study. A three-day workshop was conducted by the principal researcher to train RAs on the aims and objectives of the study and how to use the survey instrument. Every effort was made to ensure respondents feel safe and comfortable during the time of data collection. Each interview included a brief session to explain the aims and objectives of the study, get the participants informed consent, the right to end the participation, and maintenance of confidentiality. A list of support services available was also provided in case participant wish to consult as a result of emotional distresses caused because of their participation in the study. A face-to-face interview was conducted at the participants' chosen location.

Data analysis

The collected data were first entered into EpiData, version 3.1, and transferred to Statistical Package for Social Sciences, version 21, for windows for analysis. Findings are expressed in percentage, mean, and standard deviation. Bivariate analysis was conducted using Chi-squared and binary logistic regression tests. A significance level of $\alpha = 0.05$ was applied for all statistical tests.

Results

Sociodemographic characteristics

A total of 337 older participants consisted of 189 males (56.1%) and 148 females (43.9%). The mean age was 71.5 years, ranged between 60 and 101 years. Most participants were Buddhist (90.2%). Most participants (285; 84.6%) did not attend any formal schooling and spent most of the childhood days in rural villages (298; 88.4%) (Table 2). More information can be found in a publication elsewhere.[24]

Prevalence of ACEs

The most common ACEs reported by the sample were related to physical labour contribution in any state-initiated projects (284; 84.3%), followed by observation of community violence (185; 54.9%), and being a victim of the physical neglect (130; 38.6%). The witnessing of community violence (119; 63.0%) and being the victim of physical neglect (82; 43.4%) were greater among the male genders ($P < 0.05$). In contrast, experience of emotional abuse (52; 35.1%) and living with someone chronically depressed in a household (10; 6.8%) were reflected slightly more among the female gender. Overall, the prevalence of ACEs is greater among the male gender (Table 1).

Interrelationships among categories of ACEs

As displayed in Table 3, participants who experienced physical and emotional abuses reported co-occurrence with other forms of ACEs by more than or equal to half ($P < 0.05$). Under the household dysfunction, ACEs such as alcohol/drug abuse, household member treated violently, and bullying co-occurred with other forms of ACEs by more than half ($P < 0.05$). Assuming an adult role in childhood recorded the highest co-occurrence with other forms of ACEs ($P < 0.05$).

Relationship between ACEs and multiple health conditions

Detailed information on the prevalence of multiple self-reported health morbidities can be found in a publication elsewhere.[24] Compared to individual with 0–2 ACEs, those ≥7 ACEs had the higher odds of reporting lung disease (OR=2.15, 95%CI: 1.03 – 4.49), visual impairment (OR=2.38, 95%CI: 1.16 – 4.85), insomnia (OR=2.35, 95%CI: 1.11 – 4.98), memory decline (OR=2.30, 95%CI: 1.10 – 4.78) by two folds including self-rate poor health conditions (OR=1.97; 95%CI: 1.04 – 3.73). Likewise, high blood pressure (OR = 3.21, 95%CI: 1.39–7.38), gout (OR = 2.83, 95%CI: 1.09–7.33), depression (OR = 3.62, 95%CI: 1.74–7.55), and diabetes (OR = 5.12, 95%CI: 1.06–24.72) (Table 4). Individual ACEs such as difficulty meeting basic needs of life showed a significant link to a maximum number of physical health conditions, followed by assumption of an adult role while still a child, and witnessing community violence (Table 5).

Table 2
Sociodemographic characteristics of the sample.

Sociodemographic characteristics	*n* (%)
Age in years (Mean ± SD: 71.5 ± 7.7)	
60–69	143 (42.4)
70–79	132 (39.2)
≥80	62 (18.4)
Gender	
Male	189 (56.1%)
Female	148 (43.9%)
Marital status	
Married	179 (53.1)
Not married	26 (7.8)
Widowed	132 (39.2)
Religion	
Buddhism	304 (90.2)
Not Buddhist	33 (9.8)
Education level	
No formal schooling	285 (84.6)
Some form of schooling	52 (15.4)
Most of the childhood days spent	
In rural villages	298 (88.4)
Not in the rural villages	39 (11.6)
Work status in the last 12 months	
Employed	155 (46.0)
Home maker	51 (15.1)
Unemployed	131 (38.9)

SD, standard deviation.

Discussion

This study is the first of its kind to assess the prevalence of ACEs and its influence on the self-rated health morbidities among older adults in Bhutan. Almost all the participants have experienced one form of ACEs in their lifetime. The experiences of four or more ACEs were significantly higher among males similar to findings in the USA.[12] Findings from this study revealed high-frequency report of assuming an adult role, a period of extreme difficulty meeting basic needs (such as the food, shelter, and clothing), and contribution of physical labour in state-initiated projects in childhood. These ACEs were not reported in other international studies. Although such practices maybe common in an agricultural society including Bhutan, some child work can be extremely exploitative[25] leading to physical and mental health problems.[26] Concurring with previous findings from other ACEs studies,[9,11,27] respondents who have experienced all categories of abuse (physical and emotional) also significantly experienced other forms of ACEs (physical neglect, household member treated violently, witness community violence, and assuming the adult role) by more than half. These findings are significant and calls for a greater attention on ACEs prevention in Bhutan, because ACEs has an enduring long-lasting adverse effect on the psychological and psychosocial mechanisms contributing to mental disorders and physical health conditions.[28]

Table 1
Prevalence of ACE among the sample by gender.

Individual and cumulative ACEs	Male *n* (%)	Female *n* (%)	Total *n* (%)	*P*-value
1. Physical neglect experienced or not	82 (43.4)	48 (32.4)	130 (38.6)	0.040*
2. Alcohol and/or drug abuser in the household	49 (25.9)	34 (23.0)	83 (24.6)	0.532
3. Someone chronically depressed, mentally ill, institutionalised or suicidal	6 (3.2)	10 (6.8)	16 (4.7)	0.125
4. Incarcerated household member	6 (3.2)	1 (0.7)	7 (2.1)	0.141†
5. One or no parents, parental separation or divorce	10 (5.3)	7 (4.7)	17 (5.0)	0.815
6. Household member treated violently	81 (42.9)	48 (32.4)	129 (38.3)	0.051
7. Emotional abuse	65 (34.4)	52 (35.1)	117 (34.7)	0.887
8. Physical abuse	62 (32.8)	36 (24.3)	98 (29.1)	0.089
9. Bullying	40 (21.2)	22 (14.9)	62 (18.4)	0.139
10. Witnessing community violence	119 (63.0)	66 (44.6)	185 (54.9)	0.001*
11. Were you forced to assume the role of an adult to run the family	123 (65.1)	89 (60.1)	212 (62.9)	0.351
12. A period of ≥2 weeks had difficulty meeting the basic needs of life (food, clothing, shelter)?	108 (57.1)	88 (59.5)	196 (58.2)	0.669
13. Were you compelled to contribute physical labour in any state initiated projects? (Construction of roads, bridges, fortresses, etc.)	164 (86.8)	120 (81.1)	284 (84.3)	0.154
Cumulative ACEs				0.045*
0–2	25 (13.2)	35 (23.6)	60 (17.8)	
3	31 (16.4)	26 (17.6)	57 (16.9)	
4	42 (22.2)	21 (14.2)	63 (18.7)	
5–6	46 (24.3)	40 (27.0)	86 (25.5)	
≥7	45 (23.8)	26 (17.6)	71 (21.1)	

*$P < 0.05$
ACE, adverse childhood experience.

Table 3
Prevalence and co-occurrence of the ACEs.

ACEs	Prevalence *n* (%)	Correlations												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		%	%	%	%	%	%	%	%	%	%	%	%	%
Childhood abuse														
1. Physical abuse	98 (29.1)	–	77.6***	53.1***	42.9***	5.1	58.2***	2.0	8.2	31.6***	69.4**	72.4*	62.2	82.7
2. Emotional abuse	117 (34.7)	65.0***	–	50.4**	39.3***	6.0	59.8***	0.9	6.8	34.2***	66.7**	71.8*	65.0	85.5
3. Physical neglect	130 (38.6)	40.0***	45.4**	–	43.8***	3.8	36.2	1.5	3.1	19.2	47.7*	72.3**	69.2**	86.9
Household dysfunction														
4. Alcohol/drug use	83 (24.6)	50.6***	55.4***	68.7***	–	4.8	38.6	3.6	8.4	20.5	42.2**	75.9**	69.9*	91.6*
5. Mental illness	16 (4.7)	31.3	43.8	31.3	25.0	–	62.5*	6.3	0	43.8*	75.0	75.0	56.3	87.5
6. HH member treated violently	129 (38.3)	44.2***	54.3***	36.4	24.8	7.8*	–	3.1	5.4	30.2***	82.2***	71.3*	61.2	86.0
7. Incarcerated HH member	7 (2.1)	28.6	14.3	28.6	42.9	4.7	57.1	–	0	14.3	85.7	85.7	71.4	85.7
8. Parental separation	17 (5.0)	47.1	47.1	23.5	41.2	0	41.2	0	–	23.5	58.8	58.8	58.8	88.2
9. Peer violence (Bullying)	62 (18.4)	50.0***	64.5***	40.3	27.4	11.3*	62.9***	1.6	6.5	–	82.3***	77.4**	75.8**	20.4*
10. Community Violence	185 (54.9)	36.8**	42.2**	33.5*	18.9**	6.5	57.3***	3.2	5.4	27.6***	–	62.7	54.1	83.2
Other ACEs														
11. Assuming adult role	212 (62.9)	33.5*	39.6*	44.3	29.7**	5.7	43.4*	2.8	4.7	22.6**	54.7	–	71.7***	92.5***
12. Difficulty BMN	196 (58.2)	28.5	35.2	39.8	26.8*	4.9	39.1	2.1	5.3	20.4**	54.2	69.0***	–	63.4***
13. Contribution of physical labour	284 (84.3)	31.1	38.8	39.8	29.6*	4.6	40.3	2.6	5.1	24.0*	51.0	77.6***	91.8***	–

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
ACEs, adverse childhood experiences; BMN, basic minimum needs; HH, household.

Table 4
Prevalence and adjusted relative odds of specific disease by number of ACEs.

Specific health problems	Prevalence (%) OR (95%CI)	Number of Adverse Childhood Experiences				
		0–2 ($n = 60$)	3 ($n = 57$)	4 ($n = 63$)	5–6 ($n = 86$)	≥7 ($n = 71$)
Back pain	Prevalence (%)	18.1	15.9	19.5	25.2	21.2
	OR (95%CI)	1.0 (Referent)	0.71 (0.33–1.55)	0.96 (0.44–2.10)	0.82 (0.40–1.68)	0.87 (0.41–1.84)
Pulmonary disease	Prevalence (%)	13.8	14.6	18.7	26.0	26.8
	OR (95%CI)	1.0 (Referent)	1.11 (0.50–2.46)	1.39 (0.65–2.98)	1.46 (0.71–2.98)	2.15 (1.03–4.49)*
Heart disease	Prevalence (%)	18.8	25.0	12.5	12.5	31.3
	OR (95%CI)	1.0 (Referent)	1.24 (0.26–5.89)	0.67 (0.11–4.21)	0.44 (0.7–2.76)	1.55 (0.35–6.91)
High blood pressure	Prevalence (%)	14.1	17.0	16.3	23.7	28.9
	OR (95%CI)	1.0 (Referent)	1.21 (0.53–2.76)	1.11 (0.49–2.54)	1.45 (0.67–3.17)	3.21 (1.39–7.38)**
Stroke	Prevalence (%)	50.0	16.7	16.7	0	16.7
	OR (95%CI)	1.0 (Referent)	0.28 (0.03–2.81)	0.31 (0.03–3.05)	0.00	0.26 (0.3–2.56)
Diabetes	Prevalence (%)	5.9	17.6	11.8	35.3	29.4
	OR (95%CI)	1.0 (Referent)	2.93 (0.56–15.33)	1.96 (0.34–11.23)	4.89 (1.04–23.01)*	5.12 (1.06–24.72)*
Gout	Prevalence (%)	13.0	7.4	22.2	22.2	35.2
	OR (95%CI)	1.0 (Referent)	0.54 (0.15–1.95)	1.71 (0.62–4.71)	1.16 (0.43–3.15)	2.83 (1.09–7.33)*
Joint disease	Prevalence (%)	15.4	15.9	20.9	25.4	22.4
	OR (95%CI)	1.0 (Referent)	1.12 (0.54–2.32)	1.74 (0.84–3.63)	1.27 (0.65–2.49)	1.57 (0.77–3.19)
Visual impairment	Prevalence (%)	13.1	15.7	18.8	28.8	23.6
	OR (95%CI)	1.0 (Referent)	1.53 (0.73–3.19)	1.76 (0.86–3.62)	2.34 (1.19–4.63)*	2.38 (1.16–4.85)*
Hearing impairment	Prevalence (%)	15.3	9.4	23.5	23.5	28.2
	OR (95%CI)	1.0 (Referent)	0.57 (0.21–1.49)	1.65 (0.73–3.72)	1.05 (0.47–2.32)	1.81 (0.82–3.98)
Stomach ulcers	Prevalence (%)	18.3	19.7	19.7	26.8	15.5
	OR (95%CI)	1.0 (Referent)	1.17 (0.48–2.83)	0.95 (0.40–2.28)	0.85 (0.38–1.92)	0.56 (0.23–1.39)
Liver disease/Hepatitis	Prevalence (%)	16.7	16.7	33.3	33.3	0
	OR (95%CI)	1.0 (Referent)	1.06 (0.14–7.99)	2.13 (0.36–12.41)	1.05 (0.18–6.00)	0.00
Skin	Prevalence (%)	15.4	15.4	11.5	15.4	42.3
	OR (95%CI)	1.0 (Referent)	1.02 (0.24–4.29)	0.68 (0.15–3.15)	0.66 (0.16–2.75)	2.48 (0.74–8.23)
Fatigue	Prevalence (%)	15.3	12.9	17.6	28.2	25.9
	OR (95%CI)	1.0 (Referent)	0.77 (0.37–1.63)	1.05 (0.56–2.37)	1.60 (0.82–3.13)	2.01 (0.99–1.06)
Mobility impairment	Prevalence (%)	17.6	13.7	20.9	24.2	23.5
	OR (95%CI)	1.0 (Referent)	0.67 (0.32–1.41)	1.19 (0.58–2.42)	0.87 (0.44–1.69)	1.18 (0.59–2.37)
Musculoskeletal	Prevalence (%)	21.7	6.5	19.6	26.1	26.1
	OR (95%CI)	1.0 (Referent)	0.266 (0.07–1.03)	0.78 (0.29–2.09)	0.76 (0.31–1.90)	0.96 (0.38–2.41)
Depression	Prevalence (%)	11.6	15.5	16.1	28.4	28.4
	OR (95%CI)	1.0 (Referent)	1.67 (0.77–3.59)	1.46 (0.69–3.10)	2.33 (1.16–4.68)*	3.62 (1.74–7.55)**
Insomnia	Prevalence (%)	10.6	12.7	17.6	36.6	22.5
	OR (95%CI)	1.0 (Referent)	1.32 (0.59–2.98)	1.89 (0.87–4.09)	4.38 (2.11–9.09)***	2.35 (1.11–4.98)*
Memory decline	Prevalence (%)	14.7	12.3	20.1	27.9	25.0
	OR (95%CI)	1.0 (Referent)	0.73 (0.35–1.52)	1.68 (0.81–3.49)	1.83 (0.92–3.65)	2.30 (1.10–4.78)*
Self-rated poor health	Prevalence (%)	17.1	15.8	20.3	21.5	25.3
	OR (95%CI)	1.0 (Referent)	1.58 (0.79–3.15)	1.65 (0.82–3.34)	1.25 (0.63–2.47)	1.97 (1.04–3.73)*

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
ACEs, adverse childhood experiences; CI, confidence interval; OR, odds ratio.

Table 5
Relationship between individual ACEs and health conditions.

Individual ACEs	High BP	Diabetes	Lung disease	Gout	Joint disease	Visual impair	Hearing impair	Fatigue	Back pain	Mobility impair	Depression	Insomnia	Memory decline
Childhood abuse													
Physical neglect	52.5	16.5	51.6***	20.8	60.5	55.0	32.0*	54.3	70.8	50.0	52.7	40.8	59.7
Physical abuse	56.5	24.3***	34.4	20.2	61.9	55.7	28.9	56.7	70.4	46.9	50.0	43.9	71.4*
Psychological abuse	61.8*	20.2*	36.8	18.3	60.3	62.1	25.9	50.4	67.5	45.3	55.6*	47.9	64.1
Household dysfunction													
Illicit drug/alcohol abuse	57.7	22.1**	57.3***	29.3***	72.3**	51.2	30.9	61.4*	74.7	60.2**	55.4	42.2	63.9
Mental illness	72.7	0	25.0	6.7	62.5	81.3*	25.0	81.3*	75.0	37.5	62.5	68.8*	81.3
Incarcerated HH member	50.0	0	28.6	28.6	71.4	85.7	28.6	42.9	57.1	28.6	28.6	42.9	42.9
HH member treated violently	63.0*	11.6	30.7	15.2	58.6	58.9	27.1	55.8	62.0	42.6	47.3	46.5	68.0*
Bullying	61.4	13.7	32.3	11.7	53.2	63.9	26.2	59.0	67.7	40.3	361.3**	61.3**	70.5
Witnessing community violence	61.6**	11.5	22.4***	9.4***	53.3**	60.5	20.5*	47.5	58.4***	33.0***	44.9	43.2	61.4
Other ACEs													
Assume adult role	55.6	13.8	39.8	19.6*	62.3	63.3**	29.5*	55.7*	67.9	48.6	53.8***	46.7*	68.4**
Difficulty meeting BNL	56.7	13.9	49.5***	22.4**	65.1**	61.3	31.3**	56.7*	71.9*	55.6***	57.9***	50.5***	69.6***
Force labour contribution	54.4	13.2	39.9*	18.7**	62.3	60.7**	26.8	53.9*	67.7	46.8	47.3	43.6	62.0

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.
ACEs, adverse childhood experiences; BNL, basic needs of life; BP, blood pressure; HH, household.

A strong link between the number of ACEs and health outcomes were consistent with findings from precious researches in the USA,[8,12,29] UK,[7] and the Philippines.[11] Participants with higher cumulative ACEs significantly had the higher odds of reporting problems related to lungs, high blood pressure, diabetes, depression, and insomnia, which were consistent in a study by Ramiro et al.[11] Higher ACEs scores also had the higher odds of reporting visual impairment, memory decline, and diseases related to joints. Overall, the odds of self-reporting poor health status was significantly higher among those exposed to higher cumulative ACEs.[8] The existence of a significant relationship between ACEs, physical and mental health conditions in late adulthood is an indication of a lifelong influence of ACEs that affects the well-being and quality of life of a person. Prevention of ACEs and engagement in the early detection of ACEs could have a significant impact on the prevention of a wide range of critical health problems.

Furthermore, the prevalence of ACEs and its co-occurrence with other forms of ACEs would more greatly demand for the free healthcare system in Bhutan. ACEs are avertable and designing strategies to prevent ACEs is indispensable.[17] Healthcare providers could routinely discuss to educate on ACEs and its influence to clients and their families. For a spiritual country like Bhutan,[30] where philosophies of Buddhism flourishes and the acceptance of realities are highly discussed, resilience building in the face of adversities like ACEs can be explored further in the future studies among Bhutanese population. Findings also supported integrated, family-centred, and mindfulness-based trauma-informed approaches to address social and emotional trauma. The latest evidence suggests that the support from the parents, caregivers, and families in nurturing care and protection for young children is essential to achieve their developing potentials.[31] As Sustainable Development Goals provide a platform to reduce ACEs and their lifelong influence on health,[32] early detection of ACEs and interventions would be a critical investment for the fruition of productive citizens for a nation like Bhutan.

Conclusion

The most frequently reported ACEs in this study was the physical labour contribution in any state-initiated projects, with assuming an adult role in childhood recorded the highest co-occurrence with other forms of ACEs. This study also showed negative association between physical and mental health conditions with increasing ACEs.

This study has some limitations. Findings are not generalizable because of the adoption of a non-randomized convenient sample. The long pathway from the exposure to ACEs to the manifestation of signs and symptoms of health conditions is inconclusive, as it may have been confounded by many other intermediary variables. A cohort prospective research may help establish cause–effect relationship for future ACEs study in Bhutan. The topic on sexual abuse could not be assessed because of its sensitiveness among older adults. However, future research in Bhutan could explore the impact of sexual abuse because of its greater risk of developing mental health problems including depression and suicidality.[28] The assessment of ACEs heavily relied on retrospective recall for bias may have been present. However, the veracity of the recall cannot be established in a research of this nature. One unfortunate oversight was the health-risk behaviours such as chewing of betel quid commonly abused in Bhutan,[33] smoking, and drinking of alcohol, were not included in this study, which may have indicated its link with ACEs. In addition, resilience building in the face of adversities was not assessed, which could have provided clue on how older adults in Bhutan coped with their adversities.

This study has its strength as well. This study was one of the first of its kind to investigate the prevalence of ACEs and its influence on the physical and mental health morbidities using a systematic and scientific-based approach in Bhutan. ACEs such as difficulty meeting the basic needs of life and assuming an adult role in childhood had a significant association to multiple health conditions, which are not reported in other literature. Further exploration on adversities are suggested, which may be different among generations.

Author statements

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Ethical approval

The Research Ethics Board of Health (Approval REBH/approval/2011/013) of the Ministry of Health, Bhutan, and the University Human Research Ethics Committee of the Queensland University of Technology (Approval number 1300000561).

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Competing interests

None declared.

References

1. World Health Organization. *Adverse Childhood Experiences International Questionnaire (ACE-IQ)*. 2016 [Available from: http://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/.
2. Bryan RH. Getting to why: adverse childhood experiences' impact on adult health. *J Nurse Pract* 2019;**15**(2):153–7. e1.
3. Huffhines L, Noser A, Patton SR. The link between adverse childhood experiences and diabetes. *Curr Diabetes Rep* 2016;**16**(6):54.
4. White BA, Cordie-Garcia L, Fuller-Thomson E. Incarceration of a family member during childhood is associated with later heart attack: findings from two large, population-based studies. *J Crim Justice* 2016;**44**:89–98.
5. Kalmakis KA, Chandler GE. Health consequences of adverse childhood experiences: a systematic review. *J Am Assoc Nurse Pract* 2015;**27**(8):457–65.
6. Fang X, Fry DA, Brown DS, Mercy JA, Dunne MP, Butchart AR, et al. The burden of child maltreatment in the East Asia and Pacific region. *Child Abuse Negl* 2015;**42**:146–62.
7. Bellis MA, Hughes K, Leckenby N, Hardcastle KA, Perkins C, Lowey H. Measuring mortality and the burden of adult disease associated with adverse childhood experiences in England: a national survey. *J Public Health (Oxf)*. 2015;**37**(3):445–54.
8. Sonu S, Post S, Feinglass J. Adverse childhood experiences and the onset of chronic disease in young adulthood. *Prev Med: Int J Devoted Pract Theory* 2019;**123**:163–70.
9. Soares AL, Howe LD, Matijasevich A, Wehrmeister FC, Menezes AM, Goncalves H. Adverse childhood experiences: prevalence and related factors in adolescents of a Brazilian birth cohort. *Child Abuse Negl* 2016;**51**:21–30.
10. Monnat SM, Chandler RF. Long term physical health consequences of adverse childhood experiences. *Socio Q* 2015;**56**(4):723–52.
11. Ramiro LS, Madrid BJ, Brown DW. Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting. *Child Abuse Neglect* 2010;**34**(11):842–55.
12. Mersky JP, Topitzes J, Reynolds AJ. Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: a cohort study of an urban, minority sample in the U.S. *Child Abuse Negl* 2013;**37**(11):917–25.
13. Korotana LM, Dobson KS, Pusch D, Josephson T. A review of primary care interventions to improve health outcomes in adult survivors of adverse childhood experiences. *Clin Psychol Rev* 2016;**46**:59–90.
14. Raposo SM, Mackenzie CS, Henriksen CA, Afifi TO. Time does not heal all wounds: older adults who experienced childhood adversities have higher odds of mood, anxiety, and personality disorders. *Am J Geriatr Psychiatr* 2013;**22**(11):1241–50.
15. Seery MD, Holman EA, Silver RC. Whatever does not kill us: cumulative lifetime adversity, vulnerability, and resilience. *J Pers Soc Psychol* 2010;**99**(6):1025–41.
16. Hardcastle K, Bellis M, Ford K, Hughes K, Garner J, Rodriguez GR. Measuring the relationships between adverse childhood experiences and educational and employment success in England and Wales: findings from a retrospective study. *Publ Health* 2018;**165**:106–16.
17. Centers for Disease Control and Prevention. *About adverse childhood experiences*. 2019 [cited 2019 August 1]. Available from: https://www.cdc.gov/violenceprevention/childabuseandneglect/acestudy/aboutace.html.
18. Bellis MA, Hughes K, Leckenby N, Jones L, Baban A, Kachaeva M, et al. Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries. *Bull World Health Organ* 2014;**92**(9):641–55.
19. Hsu H-C. Impact of morbidity and life events on successful aging. *Asia Pac J Publ Health* 2011;**23**(4):458–69.
20. Klages U, Weber AG, Wehrbein H. Approximal plaque and gingival sulcus bleeding in routine dental care patients: relations to life stress, somatization and depression. *J Clin Periodontol* 2005;**32**(6):575–82.
21. Font SA, Maguire-Jack K. Pathways from childhood abuse and other adversities to adult health risks: the role of adult socioeconomic conditions. *Child Abuse Negl* 2016;**51**:390–9.
22. Hughes K, Bellis MA, Hardcastle KA, Sethi D, Butchart A, Mikton C, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health* 2017;**2**(8):e356–66.
23. Green SB. How many subjects does it take to do a regression analysis. *Multivariate Behav Res* 1991;**26**(3):499–510.
24. Dorji N, Dunne MP, Seib C, Deb S. Quality of life among senior citizens in Bhutan: associations with adverse life experiences, chronic diseases, spirituality, and social connectedness. *Asia Pac J Publ Health* 2017;**29**(1):35–46.
25. Punch S. Childhoods in the majority world: miniature adults or tribal children? *Sociology* 2003;**37**(2):277–95.
26. Muntaner C, Solar O, Vanroelen C, Martínez JM, Vergara M, Santana V, et al. Unemployment, informal work, precarious employment, child labor, slavery, and health inequalities: pathways and mechanisms. *Int J Health Serv* 2010;**40**(2):281–95.
27. Lu W, Mueser KT, Rosenberg SD, Jankowski MK. Correlates of adverse childhood experiences among adults with severe mood disorders. *Psychiatr Serv* 2008;**59**(9):1018–26.
28. Herzog JI, Schmahl C. Adverse childhood experiences and the consequences on neurobiological, psychosocial, and somatic conditions across the lifespan. *Front Psychiatr* 2018;**9**:420.
29. Gilbert LK, Breiding MJ, Merrick MT, Thompson WW, Ford DC, Dhingra SS, et al. Childhood adversity and adult chronic disease: an update from ten states and the District of Columbia, 2010. *Am J Prev Med* 2015;**48**(3):345–9.
30. Ura K, Alkire S, Zangmo T, Wangdi K. *An extensive analysis of GNH index. Report*. Centre for Bhutan Studies; 2012.
31. Britto PR, Lye SJ, Proulx K, Yousafzai AK, Matthews SG, Vaivada T, et al. Nurturing care: promoting early childhood development. *Lancet* 2017;**389**(10064):91–102.
32. Zeanah P, Burstein K, Cartier J. Addressing adverse childhood experiences: it's all about relationships. *Societies* 2018;**8**(4):115.
33. Dorji N. Cessation of betel quid chewing: lessons from the ex-chewers. *Bhutan Health J* 2017;**3**(1):1–6.