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# Prevalence of psychological distress among the caregivers of an endosulfan disaster victims in India: a cross-sectional community-based study

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## Abstract

**Background** Physical health needs of disaster victims take priority over mental health needs in post-disaster scenario, assessments and interventions for latter needs are done only for a shorter duration. The caregivers of the victims also bore the brunt of the disaster and their mental health needs are seldom examined and addressed. Unable to find any literature examining the mental health needs of caregivers of the endosulfan disaster victims in India, the study was planned with the objectives of assessing the prevalence and predictors of psychological distress, its relation to the level of impact, disability as well as quality of life among the caregivers of the victims of endosulfan disaster in the State of Kerala, India after 20 years.

**Method** It was a cross-sectional community-based study among 400 the caregivers of the victims of endosulfan disaster. Demographic details, distress, impact, disability and quality of life were measured using instruments such as Family Schedule, Self-Reporting Questionnaire, Impact of Events Scale, World Health Organization Disability Assessment Schedule 2.0 and World Health Organization Quality of Life Scale, respectively.

**Results** The estimated psychological distress among the caregivers of the endosulfan disaster victims was 48.7%. Distressed caregivers were found to have significant higher impact ( $t = -12.12, p < 0.001$ ), higher disability ( $t = -13.33, p < 0.001$ ), and poorer quality of life ( $t = 11.64, p < 0.001$ ) than non-distressed caregivers. On logistic regression analysis, the positive predictors of psychological distress among the caregivers of endosulfan victims were female sex, impact and psychological disability while quality of life was a negative predictor.

**Conclusions** Almost half of the caregivers of the victims of endosulfan disaster victims reported psychological distress, high level of impact and disability and a poorer quality of life. It calls for periodical mental health needs assessment and a long-term sustainable community based psychosocial care and disaster mental health programme.

**Keywords** Psychological distress, Disability, Impact, Quality of life, Caregivers of the endosulfan disaster

## Background

Disasters, natural or human-made [1–3] result in environmental degradation and damages causing human suffering beyond the coping capacity of the victims necessitating external assistance [4, 5, 7, 8]. Addressing physical [5, 9, 10], psychological [2, 8] and social issues [2] emerging out from such situations is pertinent to

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the normalization process of disaster victims. Studying the mental health consequences on the victims due to ecological contaminations [8, 9] and technological disasters [11] had been an area of interest for researchers [7] though assessment of the long-term effect started emerging only in the 1990s.

Mental health consequences of human made disasters are long-lasting and more intense than natural ones. A scoping review article reports that even after many years of the Three Mile Island Nuclear Reactor accident, victims were found to have very high distress especially women [12]. Following the drying of Aral Sea at Uzbekistan, the affected community members displayed psychological problems [13] and emotional distress higher than the normal population with the impact being more on women [14]. Studies done after 25 and 35 years in the Chernobyl disaster areas showed higher levels of distress, high vulnerability of women to mental disorders, increased rates of poor self-rated health, post-traumatic stress disorder (PTSD), anxiety and depression among the affected community members [15, 16]. PTSD manifested as persistent, intrusive memories, hyperarousal, avoidance, and negative changes in thinking and mood [17] and loss of work days were the found among the clean-up workers even after 18 years [18]. The PTSD symptoms such as intrusion and avoidance continued among the victims during the assessments done at 2–3 weeks, 18 months and 4 years after the Enschede Fireworks Disaster though there was a gradual decline in the symptoms [19].

Retirement due to World Trade Center (WTC) related disability and difficulty in functioning at work was reported among exposed fire fighters in a study [20] done after four years of the disaster and was associated with PTSD. In other studies [21, 22] among the firefighters exposed to the WTC disaster a significant association existed between distress, PTSD severity, and social/occupational functioning. Similarly, association of PTSD to loss of job after 9/11 and disability among police officers involved in 9/11 terrorist attack was uncovered 2–3 years and 5–6 years after the disaster [23]. In yet another study done after almost 1.5 decade, survivors of the WTC disaster had functional limitations, disabilities, inability to participate in or take enjoyment from previously enjoyable leisure and social activities and diminished overall quality of life [24]. Assessment of wellbeing and distress among the Fukushima Disaster evacuees showed a negative association with positive emotion, negative-free emotion, life satisfaction and general happiness, positive characteristics, and positive functioning [10, 25]. The biopsychosocial sequelae of any major disasters, thus can impact, cause distress, disability and reduce quality of life of the

victims or caregivers which can be long standing and hence it should be periodically assessed and dealt with.

The Plantation Corporation of Kerala holds acres of cashew plantations in Kasargod district, Kerala, India. As a measure to eradicate mosquitoes aerial spraying of endosulfan (pesticide) was done during 1976–2000 period causing air, water and land contamination. High prevalence of serious illnesses such as mental retardation, cerebral palsy, congenital anomalies, physical deformities, cancer, epilepsy, skin disorders, asthma, hormonal irregularities among women, infertility and so on in the exposed area is attributed to the aerial spraying of endosulfan [26–30]. Public outcry, scientific evidences, government and judicial intervention paved way for endosulfan ban in 2011. Public health facilities, private and voluntary organizations active in the area continue to help the direct victims though inadequate. But even after two decades, there is a wide perception that mental health care needs of the caregivers of the endosulfan disaster victims (CEDVs) were almost neglected. As anyone who have witnessed or experienced a disaster is affected some way or other [31], the long-term psychosocial sequelae especially the mental health needs among the caregivers deserves special attention as they tolerate the burden of taking care of victims of endosulfan disaster. To the best knowledge of the authors, so far there was no attempt to understand the mental health needs of the CEDVs from this area. Hence, the present study was undertaken to (a) assess the prevalence of psychological distress; (b) to find out the impact of the event, psychological disability and quality of life based on the severity of psychological distress and (c) to examine the predictors of psychological distress among the CEDVs.

## Methods

The study was part of the Indian Council of Social Science Research (ICSSR) funded psychosocial care programme project for the CEDVs initiated by National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore, jointly with the Department of Social Work, Central University of Kerala, Kasargod, Kerala. Participants were purposively recruited for this descriptive study by trained Master of Social Work (MSW) students from the jurisdiction areas of 14 local self-governments having Endosulfan affected persons as per their records. Randomization was avoided as the assessment exercise was a prelude to the proposed MSW students driven psychosocial care programme that sought to cover the maximum possible caregivers within a limited time frame of 1 year.

The ethical committee of NIMHANS, Bangalore, had cleared the entire project comprising trainings,

periodical assessments and psychosocial care intervention. Subsequently, the second semester MSW students of the Department of Social Work, Central University of Kerala, Kasargod, underwent 3-day basic psychosocial care training programme based on the standardized module from NIMHANS [32], the nodal agency for imparting psychosocial care for disaster survivors in India. During the training sessions, they were also familiarized with the administration of the tools of data collection. Subsequently, in the month of January, 2020 field visits were made to the houses of the identified victims and a baseline data from the 400 caregivers were collected by the students using standardized instruments. Caregivers from both sex, 18 years or above, from those families with one or more victim(s) of Endosulfan disaster suffering from at least one or more of the conditions like mental retardation, cerebral palsy, congenital anomalies, physical deformities, cancer, epilepsy, skin disorders, asthma, hormonal irregularities among women, infertility and so on and included in the official records of endosulfan victims in Kasargod District, Kerala, were only included in the study. Participation in the study was voluntary; confidentiality was ensured and written informed consent was taken from all the respondents.

The CEDVs were assessed using the instruments such as family schedule, Impact of Events Scale—Revised [IES -R], Self-Reporting Questionnaire [SRQ-20], World Health Organization Disability Assessment Schedule [WHODAS-II], Quality of Life Scale [WHOQOL-BREF] [33–37].

Family schedule was developed by Indian Council for Medical Research: Centre for Advanced Research on Community Mental Health (ICMR-CAR-CMH), NIMHANS [33] to study social, family and personal profile, earlier used in studies related to the community mental health and disaster interventions. The schedule was mildly modified so as to suit the needs of the current study. Socio-demographic details recorded were age, sex (0=female, 1 male), education (0=no formal education 1=upto 10th grade, 2=above 10th grade), marital status (0=married, 1=single/divorced/widowed), Occupation (0=no, 1=yes), Religion (0=others, 1=Hindu), number of family members (0=upto four, 1=5 or more) and domicile (0=rural, 1=urban).

IES-R is a 22-item self-reporting scale, [34] designed and validated using a specific time frame of the past 7 days that gives an assessment of symptomatic status with respect to the three domains of traumatic symptoms stemming from exposure to a traumatic event. It comprised three subscales: Intrusion, Avoidance and Hyper arousal. Items are rated on a 5-point scale ranging from 0 ("not at all") to 4 ("extremely"). The authors recommend using means instead of raw sums for each of

these subscale's scores to allow comparison with scores from the Symptom Checklist 90-Revised [38]. The IES-R yields a total score (ranging from 0 to 88). The domain-wise items are as follows: Intrusion subscale items (Seven items): 1, 2, 3, 6, 9, 16 and 20; Avoidance subscale items (Eight items): 5, 7, 8, 11, 12, 13, 17 and 22; Hyper arousal subscale items (Seven items): 4, 10, 14, 15, 18, 19 and 21. The instrument has been widely used in disaster and trauma (PTSD) assessment in India.

SRQ 20 is a 20-item scale [35] for measuring psychological distress developed by Harding and his associates in 1980 as part of a collaborative study coordinated by WHO, on strategies for extending mental health care. It can be used as a screening instrument and determining the prevalence of mental health problems at individual and community level. The response category of the questions of the scale is "1=yes" or "0=no". Maximum score is 20 and the total score is used as an index of psychological distress derived by summing up all the "yes" responses. Cut-off of 5 for males and 6 for females was considered to determine the probable case or the persons having psychological distress [39]. The WHO manual [35] reviews various SRQ studies reports its validity and reliability.

WHO-DAS-II [36] is a generic health-status instrument conceptually compatible with the WHO's International Classification of Functioning, Disability and Health (WHO-ICF)—to comprehend human functioning at physical, personal, and social levels.

WHOQOL-BREF [37] is the short form of WHOQOL-100. It is of considerable use in research studies, in establishing baseline scores in a range of areas, and looking at changes in quality of life over the course of interventions. It is a sound, cross-culturally valid assessment of QOL, reflected by its four domains: physical, psychological, social and environment.

### Statistical analysis

Analysis of the data was done using SPSS version 16 (SPSS Inc, Chicago, USA) [40] after checking the data for missing or wrongly entered variables. Descriptive statistics were assumed for socio-demographic variables. Frequency and percentages were used to present the categorical variables. Psychological distress and its association with the independent variables were found by *t* test or  $\chi^2$  test. The predictors of the psychological distress were determined by logistic regression with the variables found significant in the univariate analysis.

### Results

The mean age of the participants were 47.9 ( $\pm 1.58$ ) years. Female participants were more compared to males with former constituting 80.5% of the participants and there

was a significant difference in the proportion of females versus males falling in the case and non-case category ( $\chi^2=7.75, p<0.01$ ). A significant difference was found in the level of education ('no formal education' versus 'upto 10th grade' versus 'above 10th grade') and the case status of the participants ( $\chi^2=18.07, p<0.01$ ). While 52.3% of the participants reported their education within "up

to 10th grade' category, 31.3% have not received any formal education. Majority were married (80.3%), belonged to Hindu faith (80%) and were from rural background (99.8%). CEDVs with some forms of remunerative employment were 33.5% and those with '5 or more family members' were 51.2% (Table 1).

**Table 1** Socio-demographic profile of the caregivers

Variables		Total patients (N=400) [Mean (SD) (range)/ Frequency (%)	Probable case (N=195) [Mean (±SD) (range)/ Frequency (%)	Non-case (N=205) [Mean (±SD) (range)/ Frequency (%)	t-test/ Chi-square test (p value)
Age (years)		47.92 (13.96)	47.61 ± 14.76	48.25 ± 13.09	t = -0.45 (0.64)
Sex	Female	322 (80.5)	154 (75.1)	168 (86.2)	$\chi^2=7.75$ (0.05) **
	Male	78 (19.5)	51 (24.9)	27 (13.8)	
Educational qualification	NFE	125 (31.3)	67 (32.7)	58 (29.7)	$\chi^2=18.07$ (0.001)***
	U10	209 (52.3)	90 (43.9)	119 (61.0)	
	A10	66 (16.5)	48 (23.4)	18 (9.2)	
Marital status	Married	321 (80.3)	170 (82.9)	151 (77.4)	$\chi^2=1.90$ (0.17)
	Single	79 (19.7)	35 (17.1)	44 (22.6)	
Occupation	In a remunerative employment	134 (33.5)	72 (35.1)	62 (31.8)	$\chi^2=0.49$ (0.48)
	Not in a remunerative employment	266 (66.5)	133 (64.9)	133 (68.2)	
Religion	Hindu	320 (80)	169 (82.4)	151 (77.4)	$\chi^2=1.56$ (0.21)
	Others	80 (20)	36 (17.6)	44 (22.6)	
Number of family members	Up to 4 members	195 (48.8)	91 (44.4)	104 (53.3)	$\chi^2=3.20$ (0.07)
	5 or more members	205 (51.2)	114 (55.6)	91 (46.7)	
Domicile	Rural	399 (99.8)	205 (100)	194 (99.5)	$\chi^2=1.054$ (0.49)
	Urban	1 (0.2)	0 (0)	1 (0.5)	

NFE no formal education, U10 up to 10<sup>th</sup> Grade, A10 above 10th grade, N sample size, SD standard deviation, p value: significance of results

**Table 2** Comparison of the impact, psychological disability and quality of life of the caregivers

Variables		Probable case (N=195) [Mean (±SD) (range)/ Frequency (%)	Non-case (N=205) [Mean (±SD) (range)/ Frequency (%)	t-test (p value)
IES-Score (Impact)		28.11 (± 16.11)	10.34 (± 12.93)	- 12.12 (< 0.001)***
IES Subscales	Intrusion	9.85 (± 6.54)	3.36 (± 4.34)	- 11.62 (< 0.001)***
	Avoidance	9.25 (± 6.35)	4.25 (± 6.14)	- 8.01 (< 0.001)***
	Hypervigilance	9.00 (± 5.49)	2.73 (± 3.65)	- 13.38 (< 0.001)***
	WHODAS Score (psychological disability)	31.11 (± 19.61)	9.19 (± 13.33)	- 13.33 (< 0.001)***
WHOQOL BREF Score (Quality of life)		46.44 (± 7.41)	55.02 (± 7.32)	11.64 (< 0.001)***
WHOQOL subscales	Physical	11.97 (± 2.56)	14.76 (± 2.21)	11.64 (< 0.001)***
	Psychological	10.90 (± 2.14)	13.18 (± 2.39)	10.00 (< 0.001)***
	Social	12.88 (± 2.41)	14.53 (± 2.06)	7.31 (< 0.001)***
	Environmental	10.66 (± 2.42)	12.54 (± 2.22)	8.06 (< 0.001)***

IES Impact of Event Scale, WHODAS // World Health Organization Disability Assessment Schedule, WHOQOL-BREF World Health Organization Quality of Life Scale, N sample size, SD standard deviation, p value significance of results

\*\*\*Statistically significant at  $p < 0.001$

Among the total 400 CEDVs who participated in the study (Table 2), 195 (48.7%) were found to be having psychological distress (hence considered as probable case). CEDVs within probable cases were found to have significant higher impact ( $28.11 \pm 16.11$  v/s  $10.34 \pm 12.93$ ;  $t = -12.12$ ,  $p < 0.001$ ), higher disability ( $31.11 \pm 19.61$  v/s  $9.19 \pm 13.33$ ;  $t = -13.33$ ,  $p < 0.001$ ) and poorer quality of life (QOL) ( $46.44 \pm 7.41$  v/s  $55.02 \pm 7.32$ ;  $t = 11.64$ ,  $p < 0.001$ ). Corresponding significant difference were also seen in the subscales of impact of the events; intrusion ( $9.85 \pm 6.54$  v/s  $3.36 \pm 4.34$ ;  $t = -11.62$ ,  $p < 0.001$ ), avoidance ( $9.25 \pm 6.35$  v/s  $4.25 \pm 6.14$ ;  $t = -8.01$ ,  $p < 0.001$ ) and hyper arousal ( $9.00 \pm 5.49$  v/s  $2.73 \pm 3.65$ ;  $t = -13.38$ ,  $p < 0.001$ ). Significant difference in the quality of life between probable cases and non-cases were found in the subscales: physical QOL ( $11.97 \pm 2.56$  v/s  $14.76 \pm 2.21$ ;  $t = 11.64$ ,  $p < 0.001$ ), psychological QOL ( $10.90 \pm 2.14$  v/s  $13.18 \pm 2.39$ ;  $t = 10.00$ ,  $p < 0.001$ ), social QOL ( $12.88 \pm 2.41$  v/s  $14.53 \pm 2.06$ ;  $t = 7.31$ ,  $p < 0.001$ ), environmental QOL ( $10.66 \pm 2.42$  v/s  $12.54 \pm 2.22$ ;  $t = 8.06$ ,  $p < 0.001$ ).

To identify the independent correlates (Table 3) of psychological distress logistic regression was done by including the socio-demographic (sex, education) and clinical variables (impact, distress and quality of life) found significant in the univariate analysis. Male caregivers had significantly lesser psychological distress ( $p = 0.02$ ; OR 0.436; 95% CI 0.210–0.903) compared to females. Impact ( $p < 0.001$ ; OR 1.043; 95% CI 1.022–1.063) and disability ( $p < 0.001$ ; OR 1.056; 95% CI 1.033–1.080) predicted higher odds of psychological distress. Poorer quality of life significantly predicted higher psychological distress ( $p < 0.001$ ; OR 0.0911; 95% CI 0.875–0.950). The variance (Nagelkerke  $R^2$ ) explained by this model was 56.3%.

To summarize, 48.7% CEDVs reported psychological distress. Distressed caregivers were found to have significant higher impact, higher disability and poorer quality

of life than non-distressed caregivers. The positive predictors of psychological distress among CEDVs were female sex, impact and psychological disability while quality of life was a negative predictor.

### Discussion

The current research could be the first attempt to assess the psychological distress and its relationship with impact, distress and quality of life among the CEDVs from the affected villages in Kasargod District, Kerala State, India. Even after two decades, almost half of the caregivers of the endosulfan disaster victims, especially females report significant psychological distress. The distressed CEDVs reported higher impact, disability and poorer quality of life and all three latter variables in turn predicted psychological distress among CEDVs.

Psychological distress in nearly half of the studied population was present even after 20 long years. Similar findings among different categories of people like the survivors [16, 17] and clean-up workers [18] in the Chernobyl nuclear disaster, victims of Enschede Fireworks Disaster [19] and fire-fighters in the WTC disaster [21] was witnessed in other long-term researches in the field of human-made disasters.

Psychological distress was more among females. Further, female sex was found to be a predictor of psychological distress. Disaster literature [14, 16, 41, 42] widely reports more psychological distress among women and they are often regarded as a vulnerable group in the aftermath of any type of disasters. Across different countries and culture, women suffer from more distress than males; women and children constitute 80% of 50 million people affected by violent conflicts, civil wars, disasters and displacement [43]. Literatures that provide a better understanding on women issues and intervention strategies to reduce their emotional distress both in natural

**Table 3** Predictors of the psychological distress among the caregivers

Predictors	$\beta$	S.E. $\beta$	Wald's $\chi^2$	df	p value	E $\beta$	95% CI for $\beta$
Constant	2.987	1.174	6.468	1	0.011	19.817	
Sex (male) Ref. female	-0.831	0.372	4.991	1	0.025	0.436	0.210–0.903
Education (NFE)	–	–	7.701	2	0.021	–	
Education (U10)	0.325	0.304	1.144	1	0.285	1.384	0.763–2.513
Education (A10)	-0.792	0.429	3.403	1	0.065	0.453	0.195–1.051
IES	0.042	0.010	17.218	1	0.001***	1.043	1.022–1.063
WHODAS	0.055	0.011	23.695	1	0.001***	1.056	1.033–1.080
WHOQOL	-0.093	0.021	19.636	1	0.001***	0.911	0.875–0.950

Dependent variable: psychological distress, NFE no formal education, U10 up to 10th grade, A10 above 10th grade IES Impact of Event Scale, WHODAS // World Health Organization Disability Assessment Schedule, WHOQOL-BREF World Health Organization Quality of Life Scale,  $\beta$  probability of Type II error S.E. $\beta$  standard error for the unstandardized beta, Wald's  $\chi^2$  Wald Chi-squared test, df degrees of freedom, p value: significance of results, E $\beta$  odds ratio, CI confidence interval

\*\*\*Statistically significant at  $p < 0.001$

and human-made disasters are available in the country [44–47] and these could be used with appropriate modifications to suit the present disaster scenario. The distress level was found to be more among lesser or not educated caregivers. We could not find similar results from the human made disasters though the it was seen consistent with similar researches done in natural disasters like earthquakes where lesser education was found to have higher impact and distress level [41, 48].

Distressed caregivers were found to have greater impact, disability and poorer quality of life. Impact, disability and lesser quality of life were also found to be the predictors of psychological distress. Similar relationship was also seen among the WTC rescue, recovery and cleanup workers [49] assessed between 10 to 61 months after the attack. Presence of chronic psychological morbidity, extensive impairment of social functioning and prediction of a 17-fold risk for social disability due to probable PTSD were found. The social-occupational disability among the disaster workers with PTSD symptoms was found to be higher than a non-symptomatic group in a study related to September 11, WTC attack [22]. In a qualitative study, poor ongoing health status, functional limitations and disabilities, economic needs and social isolation were reported as causes for poor quality of life among persons with injuries suffered in the 9/11 attack [24]. A systematic review on the mental health consequences of 2011 Fukushima Nuclear Disaster reported lowered subjective well-being in the victims in eight studies included within the review [50]. In yet another study among caregivers of 2011 Fukushima Nuclear Disaster reported found them with significant emotional exhaustion, low personal accomplishment, and psychological distress [51]. The CEDVs had been tolerating the burden of care for the past several years, were undergoing through similar experiences that might explain the higher impact, distress and poor quality of life among them.

The implication of the study is that assessments in the post-disaster phase after 20 years reveals higher impact, increased distress, poor functionality and lesser quality of life among the CEDVs. A holistic psychosocial care programme (Fig. 1) facilitating the normalization of the emotional and behavioural reactions among the caregivers is highly desirable. CEDVs studied here have not received such services and hence the same should be made available to them through a sustainable community-based disaster mental health and psychosocial care programme [52]. Trained MSW students with periodical handholding support from the expert supervisors shall play the role of the community level workers with the support of the local self-governments and the existing health system [53, 54]. However, sustained motivation of the trained students, their faculty supervisors, the

extension of cooperation from the local self-governments and support from the available health systems are foreseeable challenges that can come in the path of such a programme.

#### **Limitations and strengths of the study**

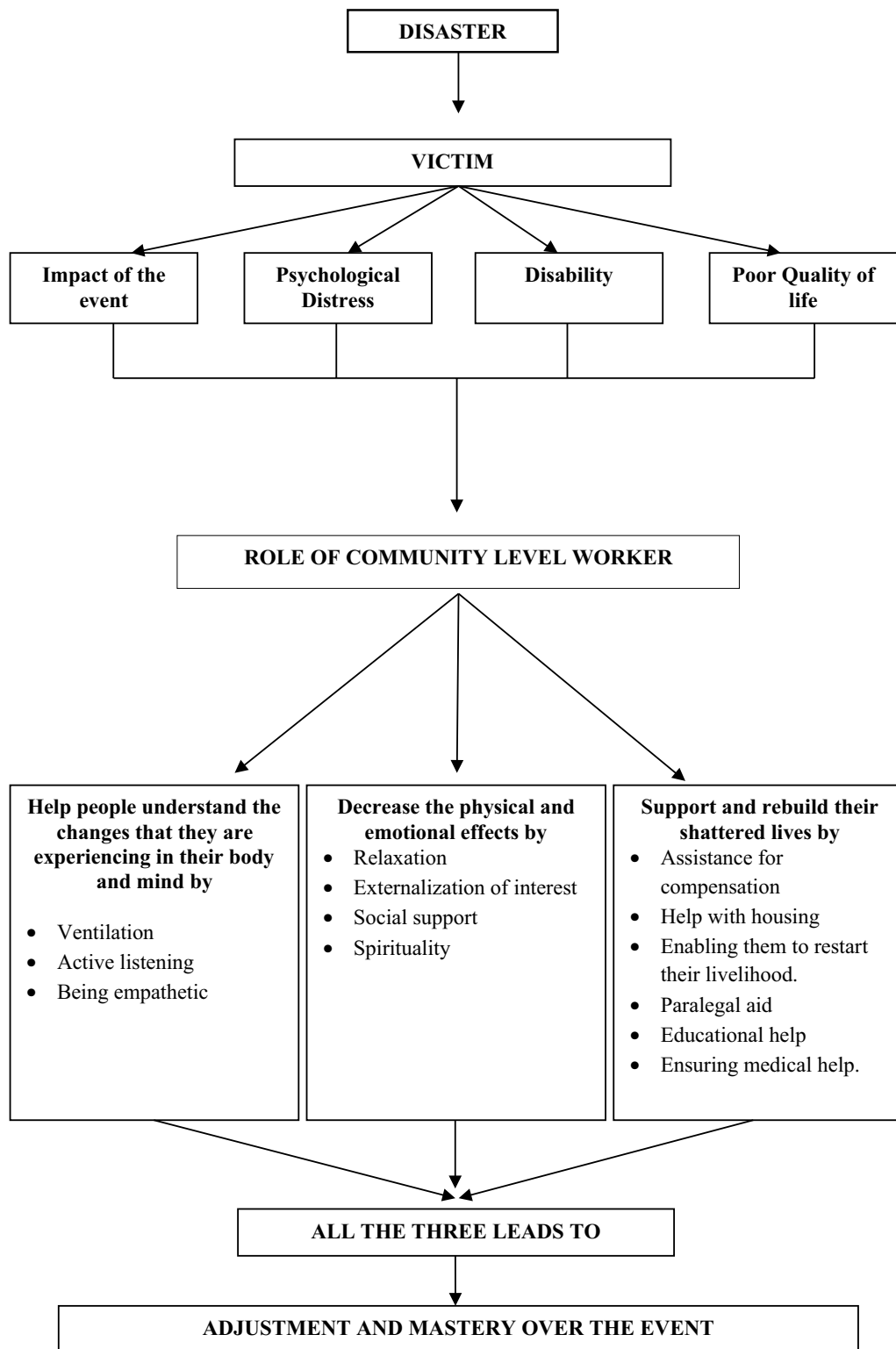
The study does have certain limitations. It has not assessed the various types of losses due to endosulfan disaster such as life loss, livelihood loss, property loss; the legal-aid needs and physical health needs which could have a bearing on the psychological distress. The current level of social support available to the caregivers also could have assessed as reinstatement or strengthening the social support system is a major psychosocial care intervention component. There was no randomization of the population which could have resulted in overrepresentation of people with higher mental health consequences and hence a high prevalence of distress among caregivers. Further, the different types of conditions suffered by the victims (such as mental retardation, cerebral palsy, congenital anomalies, physical deformities, cancer, epilepsy, skin disorders, asthma) was not collected and hence the variations in the psychological distress suffered by their caregivers could not be found. The strength of the study is that assessments were done using standardized instruments by trained Social Work students. The level of distress among the caregivers would help in categorizing the caregivers for appropriate intensity of psychosocial intervention.

#### **Scope for future research**

The baseline assessment would also be useful in tracking the changes over a period of time in the level of impact, distress, disability and quality of life among the CEDVs in the aftermath of psychosocial care programme. This could be useful to appropriately modify, change or add the intervention strategies and the impact of such changes could be further researched. Lived experience of CEDVs can be explored for understanding their varying needs at different points of time and the impact of psychosocial care programme.

#### **Conclusion**

This study found that CEDVs experience significant psychological distress even after two decades of endosulfan disaster. The psychological distress is linked to the higher impact, increased psychological disability and lesser quality of life among the caregivers. Thus, continued tracking of affected population and understanding the mental health needs at different time period is a necessity in any post-disaster scenario. Long-term community psychosocial care programme integrating locally available supports (volunteers, students, youth groups, people's representatives) and



**Fig. 1** Holistic care psychosocial care programme model [20]

resources (universities, public and private health care centres and voluntary agencies) with handholding and monitoring by trained mental health professionals is the needs of the hour. Appropriate modifications based on periodical evaluation should be incorporated in the ongoing intervention and documented.

#### Abbreviations

WHO	World Health Organization
ICSSR	Indian Council of Social Science Research
NIMHANS	National Institute of Mental Health and Social Sciences
CUK	Central University of Kerala
ICMR-CAR-CMH	Indian Council for Medical Research: Centre for Advanced Research on Community Mental Health
PTSD	Post-traumatic stress disorder
WTC	World Trade Centre
WHO BREF	Abbreviated World Health Organization Quality of Life questionnaire
SPSS	Statistical Package for the Social Sciences

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#### Author contributions

Study conception and design was done by RRP, SK; data collection was done by DD; analysis done by RRP; first draft of paper by RRP. All others edited and gave comments on the draft. All the authors read and approved the final manuscript submitted for publication.

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#### Availability of data and materials

Data will be made available upon the request to the corresponding author on reasonable request.

#### Declarations

##### Ethics approval and consent to participate

The study (NIMH-PROJ/ICSSR/KS/RA/NOTIF/2019-20 dated 22-06-2019) was approved by the Ethical Committee of NIMHANS, Bangalore. Informed Consent Form was made available and written consent was taken from the participants. Participation in the study was voluntary and confidentially was ensured.

##### Consent for publication

Not applicable.

##### Competing interests

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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