Verbal autopsy to assess causes of mortality among the economically productive age group in the tribal region of Melghat, central India

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Background & Objectives: Verbal autopsy (VA) is the systematic and retrospective inquiry (from relatives) about the symptoms of an illness prior to death. In tribal India, 67-75 per cent of deaths occur at home with an unknown cause of death (CoD). Hence, the aim of this study was to determine the CoD in the 16-60 yr age group utilizing VA.

Methods: A prospective, community based longitudinal study was conducted in 32 tribal villages in the Melghat region of Maharashtra, between 2004 and 2020. Number of deaths and VAs in 16-60 yr age group were collected by village health workers (VHWs) and supervisors, verified by five different persons (internal-external) and cross-checked by three VA interpretation trained physicians. A modified version of WHO VA was used. Cause-specific mortality fractions were calculated.

Results: Of the 1011 deaths recorded, mortality in males was significantly higher than females ($P<0.001$). A total of 763 VAs were conducted which revealed that tuberculosis was the leading CoD, followed by jaundice, heart diseases, diarrhoea, central nervous system infections and suicide. Suicides were significantly more common among males than in females ($P=0.046$). Significantly, more deaths occurred during the monsoon ($P=0.002$), especially diarrhoeal deaths ($P=0.024$).

Interpretation & conclusions: The findings of this study suggest that, in Indian tribal areas, infectious diseases are the leading causes of morbidity and one of the major causes of deaths in economically productive age group. Intensified VHW-mediated interventions are required to reduce the premature deaths.

Understanding the cause of death (CoD) is crucial for policy framing and planning programmes to improve health indicators. A reliable assessment of disease-specific mortality rates is nearly impossible in developing countries because the underlying cause (UC) is unknown or relevant information is not recorded due to poor reach and coverage of the death registration system[1]. Verbal autopsy (VA) is

a retrospective inquiry systematically conducted involving the family members of the deceased to collect information pertaining to the symptoms before death through predetermined questions to describe the CoD for home deaths[2,3]. VA will enable evidence-based decision-making and can guide public health priorities in communities without physician certified deaths[4,5].

In most resource constrained, hilly, forest, rural-tribal areas of world with high mortality, documentation of death information and medical certification of CoD is nearly impossible because of linited healthcare access, low health literacy in tribal populations and a high proportion (67 to 75%) of deaths which occur outside of the healthcare setting[6,7]. The physician-certified verbal autopsy (PCVA) approach is reportedly more effective in determining CoD in community deaths[8].

MAHAN trust, a non-governmental organization (NGO) is continually providing holistic medical services to poor tribals of Melghat for the last 25 years, conducted a 17 yr study which revealed that the age-specific mortality rate (ASMR) in Melghat was >400/100000 population[2], which is 2.25 times greater than the rest of India (178 in 2016). Deaths in the economically productive age group can have detrimental effects on the community, nation and family members, particularly children as it also reportedly increases malnutrition[9] and deaths[10].

This study was conducted to ascertain the CoD in the 16-60 yr age group in Melghat, which has previously been reported to have a disproportionately high age-specific mortality rate as compared to the Indian average. In order for intervention to prevent these premature deaths through the village based healthcare for the economically productive age group people (EPAGP), as a first step, VA in EPAGP was needed to know the CoDs to plan the programmes to reduce mortality. The objective of this study was to determine the underlying cause (UC) for cause-specific mortality and to determine contributory causes (CC) for all causes of mortality by VA in EPAGP in Melghat.

Material & Methods

A community based longitudinal prospective study was conducted from January 2004 to December 2020 in EPAGP in 34 villages of Melghat. The study was ethically approved by the Institutional Review Board of MAHAN trust. A written informed consent was obtained from all participants and the Gram Sabha of the villages.

Source population: Melghat is a hilly, forest, difficult to access, highly impoverished tribal area in Amravati district of Maharashtra. It is spread over 4000 km^2, across 320 villages. The population is 300,000 with 84 per cent poor tribal, 50 per cent semiliterate/illiterate, mostly small farmers/labourers. Melghat has poor transportation, grossly inadequate health services and low health seeking behaviour, leading to high mortality[11].

Sample size: In all 34 villages (10% of total 320 villages) from two blocks of Melghat were considered for this study (Fig. 1). A minimum of 50 per cent of total mortality was decided as the criteria for VA, considering the feasibility of such exercise in the tribal population. The World Health Organization (WHO) has recommended cluster sampling and minimum population size of 2000-20000. A two stage cluster sampling technique was employed. The first stage is a block and the second is the villages within each block. Eight clusters/villages from five zones were randomly picked up by the lottery method. Finally, 34 clusters were selected based on the willingness of the villagers and village health workers (VHWs) to participate and were block stratified. In the year 2016, two villages were dropped from the study due to administrative reasons and hence data was analysed from 32 villages. The sample unit comprised all deaths in the EPAGP in the selected villages. The total number of deaths during the period was 1011. Verbal autopsies were conducted in 763 (75.46%) deaths.

Inclusion and exclusion criteria: *De-facto* method (home and hospital deaths in the study area) was used[12]. Only close relatives of all deceased individuals who gave consent were included in this study. Those who migrated (≥6 months ago) were excluded from the study.

Study tool and technique:

Vital event capture methodology: The VHWs, who were residents of the same villages, conducted a census (including population in EPAGP), that included a baseline door-to-door survey regarding deaths (16-60 yr) and demographic information in January 2004. They were supervised by data collection supervisors and project managers. It was reviewed by the principal investigator. Multiple methods were used for death data collection in the community to improve the accuracy of death statistics[11].
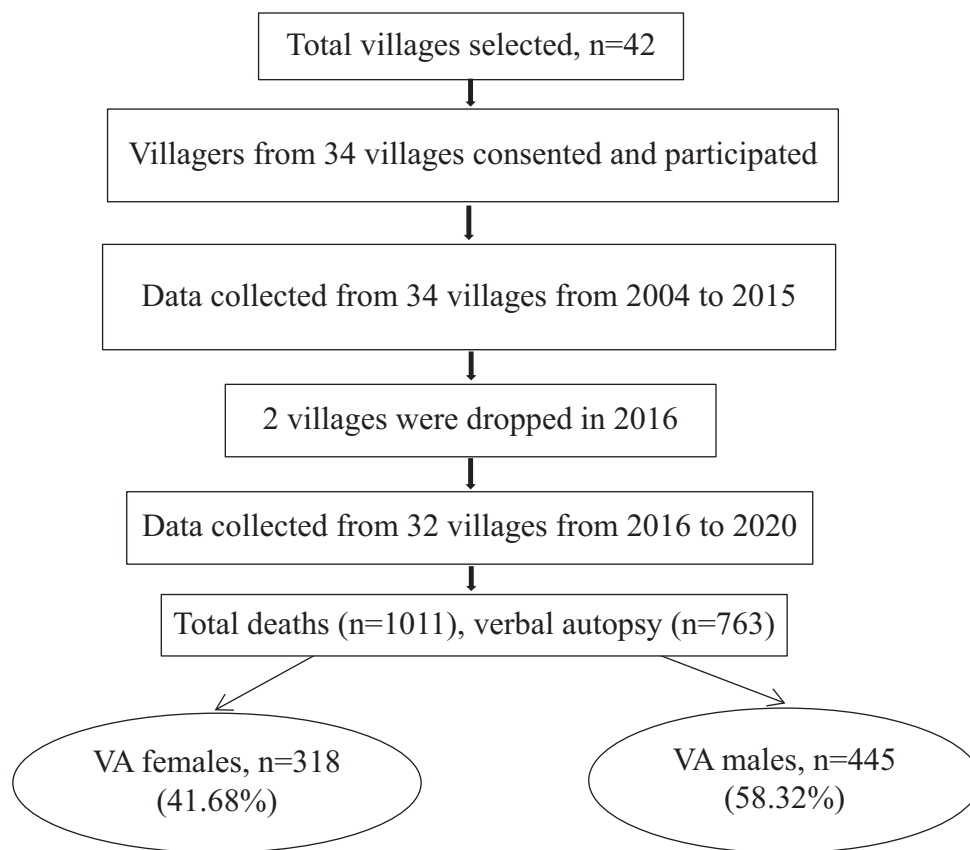
Fig. 1. Selection of study participants.

Standardized VA tool developed by MAHAN was used. It was the modified version of the WHO VA tool[13] adapted to the local context. The MAHAN VA tool consisted of a standardized questionnaire (open and close ended) that gathered information on symptoms, medical history and circumstances preceding the death. The tool included a set of standard algorithms for determining major CoD among EPAGP. The CoD, or the sequence of causes that led to a death, was assigned based on the data. The tool was piloted for validation by a senior physician, among 20 deaths at a medical college in Sewagram (data not shown). The CoD by VA was compared with the hospital CoD and there was >75 per cent agreement between the two. The validity of this tool was confirmed with three different physicians/co-investigators and two field staff. From 2004 to 2010, the same VA data collection tool was used. Modifications were subsequently made based on our field experience and the WHO[4] and IHME methods[14].

The well trained team speaking local dialect included a local tribal semiliterate VHW from each village and data collection supervisor. Grief counselling was done within 48 h of death and before conducting VA by the team, who conducted VA within seven to 15 days of the death of the person, after obtaining informed consent from the relatives. The process consisted of: (*i*) asking the family members open and close ended questionnaires; and (*ii*) its analysis[15].

A trained medical supervisor cross checked the VA forms. VA with its algorithms was checked by two other VA interpretation-trained doctors who independently assessed it for CoD. If the CoD determined by two doctors concurred, then that defined the CoD. The agreement level between two coders was 89.39 per cent. In 11 per cent of VA, there was discrepancy in CoDs by two doctors. Following underlying CoDs were different in the two coders: Tetanus, central nervous system (CNS) infection *vs.* intracranial space occupying lesions, intestinal obstruction *vs.* perforation peritonitis, diabetes mellitus, tuberculosis (TB) and acquired immunodeficiency syndrome. The authors sent discrepant VAs to a third coder, an experienced physician who acted as an arbitrator. The arbitrator personally checked the VA, verified the discrepancy

and finalized the CoD. There were 15 garbage codes in all deaths. However, only two of these were included in the final list and the rest were the part of a miscellaneous CoD.

As the CoD was determined by VA, it was not possible to conduct bacteriological confirmation for TB. TB was differentiated from chronic obstructive pulmonary disease (COPD) by the following history: presence of haemoptysis, significant weight loss, extreme fatigability and anorexia during the last one month, family/past history of TB, no BCG vaccination, any lump in cervicaland/axillary area, presence of any associated symptoms such as neck pain, headache, vomiting, change in voice, difficulty in deglutition, fever suggested that TB (pulmonary or extrapulmonary) was the CoD. The following history favoured COPD: excessive breathlessness leading to difficulty in day-to-day routine activities and patient had to sit for long time/days without sleeping in supine position, patient had cough with white mucoid expectoration for a minimum for two months every year which increased during winter for three consecutive years, cyanosis, recurrent breathlessness, history of smoking, *etc*. The table showing algorithms for TB and COPD and VA form is attached as Annexures 1 and 2.

Statistical analysis: Data entry was done using Microsoft Excel 2007. Cause-specific mortality fractions (CSMF) were calculated as the number of deaths from specific cause, divided by the total deaths, during a given time interval[16]. The homogeneity of event occurrence between gender types and seasons was tested using the Pearson's Chi-square test of homogeneity. The analysis was done independently for each study period. The computations were performed using the SPSS version 26.0 (IBM Corp., Armonk, NY, USA) software and the significance was evaluated at five per cent level.

Results

The completeness of death reporting was ~95 per cent. The population of the 32 villages was 29,356, with 15,002 (51.1%) males and 14,354 (48.9%) females. The minimum sample size needed was 500 VA. Seven hundred and sixty three VA were randomly undertaken to improve the confidence interval and accuracy. There were no significant differentials in the response rates over time or by age/sex of the deceased. Only response rates varied across surveyors.

Table I shows age sex distribution of the study population and occurrence of deaths during three study

Table I. Age-sex distribution of study population and occurrence of deaths during the three study periods

Age (yr)	Gender	Total population[#], n (%)	2004-2009 Deaths	2010-2015 Deaths	2016-2020 Deaths	2004-2020		
						Deaths/100,000 population per yr	Total deaths	% (95% CI)
16-20	Male	1826 (21.3)	22 (10.2)**	25 (10.9)	8 (5.7)	177.18	55	3.01 (2.28-3.9)
	Female	1882 (23.2)	32 (16.8)	21 (15.4)	9 (8.9)	193.79	62	3.29 (2.53-4.2)
21-30	Male	2945 (34.3)	51 (23.7)	51 (22.4)***	31 (21.9)*	265.65	133	4.52 (3.79-5.33)***
	Female	2893 (35.6)	46 (24.2)	21 (15.4)	16 (15.9)	168.76	83	2.87 (2.29-3.54)
31-40	Male	1999 (23.3)	53 (34.7)	36 (15.8)	15 (10.6)	306.04	104	5.2 (4.27-6.27)
	Female	1778 (21.9)	40 (21)	23 (16.9)	20 (19.8)	274.6	83	4.67 (3.74-5.75)
41-50	Male	1234 (14.4)	57 (26.5)	55 (24.2)*	32 (22.7)	686.43	144	11.67 (9.92-13.59)
	Female	1014 (12.5)	51 (26.8)	28 (20.6)	29 (28.7)	626.52	108	10.65 (8.82-12.71)
51-60	Male	575 (6.7)	32 (14.9)	61 (26.8)	55 (39)	1514.07	148	25.74 (22.21-29.52)***
	Female	550 (6.8)	21 (11)	43 (31.6)	27 (26.7)	973.26	91	16.55 (13.54-19.92)
Total (16-60)	Male	8579 (100)	215 (53.1)	228 (62.6)	141 (58.5)	400.43	584	6.81 (6.28-7.36)***
	Female	8117 (100)	190 (46.9)	136 (37.4)	101 (41.7)	309.44	427	5.26 (4.79-5.77)

[#]As per census 2009; *P* *<0.05, **<0.01, ***<0.001. CI, confidence interval

Table II. Age-wise distribution of cause-specific mortality during three study periods

Age groups (yr)	Major causes of deaths	2004-2009		2010-2015		2016-2020		2004-2020 17 (yr)		Deaths/100,000 population per yr		UC + CC, % (95% CI)
		UC	CC	UC	CC	UC	CC	UC	CC	UC	CC	
16-20	TB	10	5	12	10	0	1	22	16	34.9	25.38	1.02 (0.7-1.4)
	Diarrhoeal disease	6	6	11	6	2	1	19	13	30.14	20.62	0.8 (0.59-1.22)
	Suicide	4	4	3	3	0	0	7	7	11.1	11.1	0.38 (0.21-0.63)
	Jaundice	4	2	1	2	1	1	6	5	9.52	7.93	0.30 (0.15-0.53)
21-30	TB	17	9	21	19	2	3	40	31	40.3	31.24	1.22 (0.95-1.53)
	Suicide	7	7	8	8	1	1	16	16	16.12	16.12	0.55 (0.37-0.77)
	Jaundice	7	5	8	4	2	4	17	13	17.13	13.1	0.51 (0.35-0.73)
	Diarrhoeal disease	2	4	4	5	1	2	7	11	7.05	11.08	0.31 (0.18-0.49)
31-40	TB	10	7	12	13	4	2	26	22	40.49	34.26	1.01 (0.71-1.38)
	Diarrhoeal disease	5	4	6	6	1	1	12	11	18.69	17.13	0.61 (0.39-0.91)
	Jaundice	4	4	7	5	0	0	11	9	17.13	14.02	0.53 (0.32-0.82)
	Suicide	4	4	2	2	1	1	7	7	10.9	10.9	0.37 (0.2-0.62)
41-50	TB	16	6	20	19	4	7	40	32	104.67	83.73	3.2 (2.51-4.02)
	Heart diseases	13	11	10	9	4	6	27	26	70.65	68.03	2.36 (1.77-3.07)
	Diarrhoeal diseases	5	9	4	4	1	3	10	16	26.17	41.87	1.16 (0.76-1.69)
	Jaundice	2	2	10	6	1	1	13	9	34.02	23.55	0.98 (0.61-1.48)
	CNS infection	4	4					4	4	10.47	10.47	0.36 (0.15-0.7)
51-60	TB	0	0	20	18	8	8	28	26	146.41	135.95	4.8 (3.63-6.22)
	Heart diseases	8	15	20	13	4	4	32	32	167.32	167.32	5.69 (4.41-7.21)
	Diarrhoeal diseases	8	7	4	6	1	1	13	14	67.97	73.2	2.4 (1.59-3.47)
	CNS infection	3	6	4	3	3	4	10	13	52.29	67.97	2.04 (1.3-3.05)
	Jaundice	3	2	7	3	1	1	11	6	57.52	31.37	1.51 (0.88-2.41)

UC, underlying cause; CC, contributory cause; TB, tuberculosis; CNS, central nervous system

Table III. Gender-wise distribution of causes of deaths and cause-specific mortality fractions (CMSF) during the three study periods

Cause of death	2004-2010					2011-2015					2016-2020				
	UC (n)		CC (n)		CSMF (%)	UC (n)		CC (n)		CSMF (%)	UC (n)		CC (n)		CSMF (%)
	Male	Female	Male	Female		Male	Female	Male	Female		Male	Female	Male	Female	
TB	20	33	11	15	13.5	50	35	48	31	22.53	11	8	8	8	16.5
Jaundice	10	10	6	9	6	27	16	13	11	9.2	4	0	2	1	3.3
IHD	15	7	10	7	6.7	17	8	14	9	6.6	3	3	6	7	9
Diarrhoeal diseases	12	14	16	14	9.6	10	5	12	5	4.4	5	2	3	5	7.1
CNS infection	11	8	16	16	8.7	9	5	13	9	4.9	1	1	4	1	3.3
Suicide	13	4	13	4	5.8	17	6	17	6	6.3	1	1	1	1	1.9
Pneumonia	4	6	16	15	7	3	0	8	4	2.1	3	5	10	6	11.3
Cancer	5	7	4	4	3.4	13	11	10	10	6	4	3	2	2	5.2
CVE	5	5	5	7	3.8	3	8	4	8	3.2	3	1	1	0	2.4
COAD	7	4	7	6	4.1	3	3	5	3	1.9	4	3	1	2	4.7
RTA	1	0	1	0	0.3	8	0	8	0	2.2	2	0	4	0	2.8
Alcohol toxication	5	0	5	0	1.7	3	1	3	1	1.1	3	1	0	1	2.4
AIDS	4	2	1	1	1.4	3	2	3	1	1.2	1	2	0	2	2.4
Tetanus	3	1	3	1	1.4	5	0	5	0	1.4	2	0	2	0	1.9
RF	1	0	2	0	0.5	5	5	5	3	2.3	0	0	0	0	0
Homicide	5	2	5	2	2.4	2	1	2	1	0.8	0	0	0	0	0
Snake bite	2	0	2	0	0.7	5	1	5	1	1.7	0	0	0	0	0
Drowning	2	1	2	1	1	3	0	3	0	0.8	0	0	0	0	0
ALD	0	0	0	0	0	5	0	5	0	1.4	1	0	0	0	0.5
Miscellaneous	35	29	35	31	22.2	37	29	45	33	19.8	9	19	13	13	25.5
Total	160	133	160	133	100	228	136	228	136	100	57	49	57	49	100

Cause of death	2004-2020						
	UC (n)		CC (n)		Total (UC + CC)	CSMF, % (95% CI)	Deaths /100,000 population per yr
	Male	Female	Male	Female	Male + female		
TB	81	76	67	54	278	18.22 (16.31-20.25)	97.95
Jaundice	41	26	21	21	109	7.14 (5.9-8.55)	38.4
IHD	35	18	30	23	106	6.95 (5.72-8.34)	37.35
Diarrhoeal diseases	27	21	31	24	103	6.75 (5.54-8.13)	36.29
CNS infection	21	14	33	26	94	6.16 (5.01-7.49)	33.12
Suicide	31	11	31	11	84	5.5 (4.41-6.77)	29.59
Pneumonia	10	11	34	25	80	5.24 (4.18-6.48)	28.19
Cancer	22	21	16	16	75	4.91 (3.88-6.12)	26.42
CVE	11	14	10	15	50	3.28 (2.44-4.3)	17.62
COAD	14	10	13	11	48	3.15 (2.33-4.15)	16.91
RTA	11	0	13	0	24	1.57 (1.01-2.33)	8.46
Alcohol toxication	11	2	8	2	23	1.51 (0.96-2.25)	8.1
AIDS	8	6	4	4	22	1.44 (0.91-2.17)	7.75
Tetanus	10	1	10	1	22	1.44 (0.91-2.17)	7.75
RF	6	5	7	3	21	1.38 (0.85-2.1)	7.4

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Cause of death	2004-2020					
	UC (n)		CC (n)		Total (UC + CC)	CSMF, % (95% CI)	Deaths /100,000 population per yr
	Male	Female	Male	Female	Male + female		
Homicide	7	3	7	3	20	1.31 (0.8-2.02)	7.05
Snake bite	7	1	7	1	16	1.05 (0.60-1.7)	5.64
Drowning	5	1	5	1	12	0.79 (0.4-1.37)	4.23
ALD	6	0	5	0	11	0.72 (0.36-1.29)	3.88
Miscellaneous	81	77	93	77	328	21.49 (19.46-23.64)	115.56
Total	445	318	445	318		100	

RTA, road traffic accident; CVE, cerebrovascular episode; AIDS, acquired immunodeficiency syndrome; RF, renal failure; ALD, alcoholic liver disease

periods. In the 21-30 yr category, during 2010-2015 and 2016-2020, the proportion of male deaths was significantly higher than that of females ($P<0.001$ and $P=0.032$, respectively). In the 41-50 yr category, the proportion of male deaths was significantly higher than females ($P=0.034$) for the period 2010-2015. In the 51-60 yr category, for the period 2016-2020, the male deaths were significantly higher than that of females ($P=0.003$). Overall, for the last two study periods, the male deaths were significantly higher than females. The male deaths (all age groups (16-60 yr), 21-30 and 51-60 yr groups) were significantly higher than that of females for total 17 yr ($P<0.001$, $P<0.001$ and $P<0.001$, respectively). There was a significant increase in deaths per 10,0000 population per year in the age group of 41-50 yr and 51-60 yr as compared to previous age groups. Table II shows the age wise distribution of cause-specific mortality during three study periods.

CNS infections were more common among the older age groups as compared to the younger one. TB was the most common CoDs in all age groups except in the 51-60 yr age group.

Table III provides the gender-wise distribution of CoDs and CSMF during the three study periods. The subjects comprised of 41.68 per cent females and 58.32 per cent males.

TB was the leading UC as well as CC of deaths acros sall age groups, equally distributed across both genders. Jaundice was the second leading CoD followed by heart diseases and diarrhoeal diseases. Heart diseases, jaundice, homicide, alcohol intoxication, tetanus, drowning, snakebite and alcohol liver diseases were more common in males. Suicide and road traffic accidents (RTAs) were significantly more common in males than females ($P=0.046$ and

0.018, respectively). Deaths due to tetanus in Melghat were significantly higher (7.75 per 100000 population per year) as compared to the rest of India (1.12 per 100,000 UI) and equal to the highly impoverished countries such as south Sudan (7.62 per 100,000 UI)[17]. Out of total deaths, 50 per cent of deaths are due to preventable infections. Deaths due to TB were also higher in Melghat than rest of the India.

Table IV and Figure 2 provides the seasonal pattern of major UCs of death during the three periods. During the period 2011-2015, the proportion of deaths due to TB and jaundice was significantly higher in the winter and summer seasons as compared to the rainy season. Further, the deaths due to TB were significantly higher in winter as compared to other seasons ($P<0.001$) and the deaths due to diarrhoeal diseases were significantly higher in the rainy season as compared to other seasons ($P=0.013$). The proportion of CNS infection was also significantly higher in the rainy season as compared to other seasons ($P=0.002$) and deaths due to heart diseases were significantly higher during the summer season ($P=0.044$). Chronic obstructive airway disease (COAD) was higher during the monsoon.

Discussion

In this study, the deaths in EPAGP were found to be higher than the national average. Health outcomes in this population have been reported to be poor because of poverty, low heath literacy, inaccessible and grossly inadequate healthcare services, low health seeking behaviour[18], poor hygiene[19] and high prevalence of addiction[20].

A high rate of premature adult mortality is reported as a major issue at the population level as it creates a negative impact on families and communities[21].

CoD across EPAGP in India and worldwide shows respiratory infections, diarrhoeal diseases and non-communicable diseases as the major CoD[1,3,22], a similar trend was also observed in Melghat.

In the present study, TB was found to be the most common underlying CoD across all age groups indicating shortfalls in outreach of the existing TB control programme and the need for extensive revision of such programmes suitable for the tribal areas. The prevalence of TB is high in the tribal area of Melghat (>0.4%), twice as compared to the national average due to low health literacy, crowded living conditions, delayed diagnosis, high prevalence of smoking and malnutrition, inaccessible health facilities and poverty[23,24]. Jaundice was reportedly the second most common UC across all age groups. This could be due to abuse of single use unsterile injections to multiple patients[25] by unlicensed healthcare providers, multiple sexual partners[26] drinking impure water[22] and blood transfusion without testing for hepatitis virus[27]. Heart and diarrhoeal diseases were the third and fourth leading CoD. High diarrhoeal mortality is because of impure drinking water (90%) and impure food, inadequate hand hygiene and a high prevalence of malnutrition (body mass index<18.5)[28]. Intensive vaccination can prevent many deaths due to infections.

Heart diseases were the second leading CoD in the age group of 41-60 yr. The shift from infectious to non-communicable diseases in the adult age group shows the epidemiological transition in India[29]. The risk factors for heart diseases in Melghat are high tobacco and alcohol use, high prevalence of hypertension (10% in EPAGP), low birth weight (43%)[30,31] and severe malnutrition in the age group of 0-5 yr (20%)[30]. Suicide is the sixth most common UC CoD mainly seen in 16-40 yr' group indicating significant mental health issues in younger population warranting attention[32]. Many of the suicides were under the influence of alcohol or due to family disputes. Depression and anxiety may go unnoticed in the tribal areas in the context of limited family support. The greatest burden of suicide is seen in young people in developing countries[33].

The probable causes of significantly high death rate in males in the present study were high risk behaviour of males *e.g.*, smoking, alcoholism, more outdoor activities, occupational hazards and mental health issues, *etc*. These findings are in coraboration with other studies[7]. In the present study, jaundice deaths were more frequent in males due to more high

Table IV. Seasonal pattern of major underlying causes of death during the three periods

Causes of deaths	2004-2010			2011-2015			2016-2020			2004-2020			Deaths/100,000 population per yr		
	Rain (n=104), n (%)	Winter (n=98), n (%)	Summer (n=91), n (%)	Rain (n=151), n (%)	Winter (n=115), n (%)	Summer (n=98), n (%)	Rain (n=32), n (%)	Winter (n=35), n (%)	Summer (n=39), n (%)	Rain	Winter	Summer	Rain	Winter	Summer
TB	16 (15.3)	22 (22.4)	15 (16.5)	9 (5.9)	29 (25.2)***	25 (25.5)***	6 (18.8)	7 (20)	6 (15.4)	31	58	46	32.77	61.30***	48.62
Diarrhoeal diseases	13 (12.5)	6 (6.1)	7 (7.7)	12 (7.9)	5 (4.4)	1 (1)	4 (12.5)	1 (2.9)	2 (5.1)	29	12	10	30.65**	12.68	10.57
Heart disease	10 (9.6)	11 (11.2)	11 (12.1)	7 (4.6)	12 (10.4)	12 (12.2)	2 (6.3)	2 (5.7)	7 (17.9)	19	25	30	20.08	26.42	31.71*
CNS infection	9 (8.6)	6 (6.1)	4 (4.4)	21 (13.9)***	5 (4.4)	2 (2)	0	0	2 (5.1)	30	11	8	31.71**	11.63	8.46
Jaundice	7 (6.7)	4 (4.1)	8 (8.8)	3 (1.9)	14 (12.2)**	8 (8.2)**	3 (9.4)	1 (2.9)	0	13	19	16	13.74	20.08	16.91
COAD	5 (4.8)	4 (4.1)	2 (2.1)	11 (7.3)**	1 (0.9)	2 (2)	0	4 (11.4)	3 (7.7)	16	9	7	16.91	9.51	7.4
Cancer	3 (2.9)	4 (3.1)	5 (5.5)	2 (1.3)	6 (5.2)	7 (7.1)	1 (3.1)	4 (11.4)	2 (5.1)	6	14	14	6.34	14.8	14.8
Tetanus	2 (1.9)	2 (2)	0	2 (1.3)	2 (1.7)	1 (1)	0	1 (2.9)	1 (2.6)	4	5	2	4.23	5.28	2.11

*Obtained using Pearson's Chi-square test. Rain; rainy season. TB, tuberculosis; CNS, central nervous system; COAD, chronic obstructive airway disease
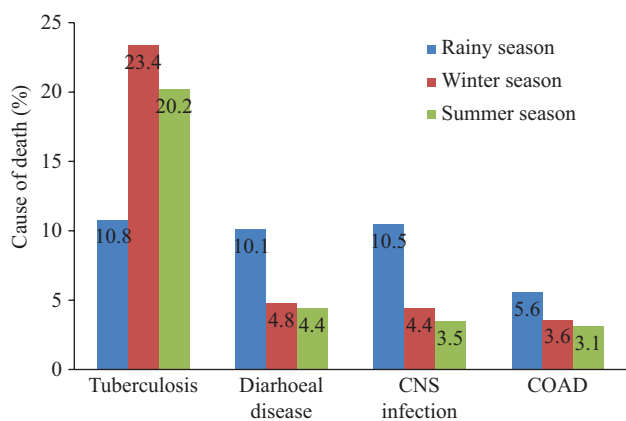
Fig. 2. Seasonal variation of causes of deaths during the study period (2004-2020). CNS, central nervous system; COAD, chronic obstructive airway disease

risk behaviour *e.g.*, multiple sex partners, alcoholism (50%), drinking impure water because of more frequent outdoor activities similar to previous reports[4,7]. Diarrhoeal deaths were more common among males, because of more outdoor work particularly due to consumption of impure outdoor water and impure food, and lesser tendency for handwashing with soap. Similar findings have been found in other low-income settings, such as in Gaza, where the prevalence of diarrhoea is reportedly higher in males (5.4/100) as compared to females (1.3/100)[34]. On the other hand in Melghat death due to heart diseases (coronary artery disease) are reportedly more common in males due to the higher prevalence of smoking, alcoholism and hypertension[20].

In the present study, suicide deaths were more common in males than females similar to previous reports, indicating significantly more personal/social reasons and mental disorderin males[35]. Many suicides in Melghat were recorded as under the influence of alcohol. In present study, COAD (chronic obstructive airway disease) or COPD (chronic obstructive pulmonary disease) deaths were more common in males due to more smoking and outdoor pollution. RTA as CoD was significantly more in males than females. Motorbikes are the important mode of transport in Melghat due to inadequate public transport. Driving motorbikes, especially under the influence of alcohol is significantly higher amongst the tribal males. Similar findings were found in Iran[36].

In the present study, significantly higher deaths occurred during the rainy season. The difference in the proportion of deaths across season was significant (*P*=0.002). It is because of more deaths due to diarrhoeal diseases, CNS infections and COAD during the rainy season. This highlights that the onset of rainy season opens the door to various infections and diseases due to unhygienic conditions. Poor transport connectivity during this season further inhibits access to hospitals. In the present study, TB deaths were found to be maximum in the winter season in Melghat when the temperature reaches to 2°C and people live in enclosed huts without proper ventilation leading to a greater risk of TB exposure. It is in contrast to the majority of studies (n=49), where TB decreased during winter[24]. In present study, diarrhoeal deaths were significantly more common during the rainy season, similar to previous studies[37]. It is because of more impure drinking water and more flies infecting food during the rainy season. There is no system for water purification and control of flies in Melghat. Open defecation (>90%) exacerbates more contamination of water and contamination by flies (unpublished data). Deaths due to CNS infections were more common in Melghat during the rainy season because of unhygienic surroundings in villages, poor drainage systems and water logging leading to mosquito breeding and more cerebral malaria/viral encephalitis, similar to the findings from a rural hospital in Uganda[38].

In our study, COAD was more common during the rainy season with increased morbidity and mortality, due to the increased prevalence of respiratory viral infections[6].

We used these CoD by VA to plan cluster randomized control trial (CRCT) to reduce ASMR. Our CRCT resulted in significant reduction in ASMR in intervention villages as compared to control villages (*P*<0.001), demonstrating the reliability of VA. Accurate information of CoD is essential for health policy, planning, monitoring, evaluation, comparisons, public attention and reducing premature deaths[39].

This study was not without limitations. The study team chose to use the physician-reviewer method for diagnosis. Diagnosis of TB was not made by bacteriological confirmation. The accuracy of VA to know the CoDs was 75 per cent. This was a long-term follow up study of 16 yr. During the study, the interviewers were changed and the quality of data obtained could have been affected due to the poor educational status of responders. Furthermore, some villages were dropped out of the study and new villages

were added in between the tenure. This may have limited the interpretation of trends in CoD over time.

Overall, our data showed that communicable diseases are the major CoDs (59.18%) in EPAGP. Providing oral rehydration solution (ORS) to all diarrhoea cases can save many lives immediately. Improving access to TB diagnosis and treatment services and ensuring treatment adherence can break the chain of transmission and prevent unnecessary deaths due to TB. It is essential to strengthen the routine death registration systems to cover all the locations and population groups across India.

As per our study finding from 2004 to 2021, the mortality rate in EPAGP among tribals in Melghat is more than 400 per 100,000 population of that age group per year. If we extrapolate our findings to all tribal areas of India, then, more than 208,846 people of EPAGP are dying every year[40].

Conflicts of Interest: None.

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Annexures

Annexure 1: Algorithm for respiratory diseases (pneumonia, TB and COPD) in verbal autopsy format.

II) Respiratory system disorder:

1. Did the patient has cough?

   Yes ( )   No ( )   Don't know ( )

2. Was the patient breathless? Was there any difficulty in breathing?

   Yes ( )   No ( )   Don't know ( )

<u>If both answers are no, then skip subquestions 3 to 7 of question II and move to question **III.**</u>

<u>But if one or both answers are yes, then continue the subquestions 3 to 7 of question II.</u>

3. Since how long patient had the cough? _____

   E (more than 24 hours)

4. Was red expectoration seen in cough?

   C Yes ( )   No ( )   Don't know ( )

5. Since when was the shortness of breath? -------------,

   C (more than 6 hours)

6. Was there a fever?

   S Yes ( )   No ( )   Don't know ( )

7. Was there any chest wall indrawing?

   C Yes ( )   No ( )   Don't know ( )

8. Was there chest pain?

   S Yes ( )   No ( )   Don't know ( )

   Did chest pain increased with deep inspiration or breathing?

   C Yes ( )   No ( )   Don't know ( )

Pneumonia
  Possible= 1E + 1S
  Most probable =1E + 1C + 2S or 1E + 2C

If the symptoms (cough or fever) of sub questions 3 to 6 from question II, lasted for more than 15 days, then ask sub questions 9 to 25 of question II. If not, then go to question **III)**

9. Since when the patient had cough ? --------

    E Yes (if more than 15 days, then 1E) ( )   No ( )   Don't know ( )

10. Was there blood in the cough?

    C Yes (   )   No ( )   Don't know ( )

11. Was there history of weight loss? (significant during last 15 days or more)

    E Yes ( )   No ( )   Don't know ( )

12. How was the patient's health in the last 15 days?

    E Sick ( )   was good ( )   Don't know ( )

13. Was patient severely fatigued during last one month?

    S Yes ( )   No ( )   Don't know ( )

14. How was the appetite of the patient for the last 30 days before death?

    S Less ( )   good ( )   Don't know ( )

15. Did the patient had TB (tuberculosis)?

    S Yes ( )   No ( )   Don't know ( )

16. Did the patient come in contact with someone who had TB? (tuberculosis)

    S Yes ( )   No ( )   Don't know ( )

17. Was the patient administered TB vaccine (BCG)?

    Yes ( )   **S** No ( )   Don't know ( )

18. Was there any lump in the neck/armpit of the patient for more than 15 days?

    C Yes ( )   No ( )   don't know ( )

19. Did the patient had neck pain or headache and vomiting for more than 15 days?

    S Yes (---------------------)   No (   ),   don't know ( )   ,

20. Was there any change in the voice of patient, hoarseness and difficulty in swallowing?

   S Yes (----------------------)   No (   ),   don't know ( ),

21. Was there any breathlessness / shortness of breath/ intercostal indrawing? And since when?

   C Yes (----------------------)   No (   ),   don't know ( ),

TB
Possible = E1+ 1S +1C / 2E + 3S
Most probable = 3E + 2C or 2E + 1C +5S   or   2E+2C+2S

(Note: If cough persists for more than 15 days, then there is a more probability of TB)

22. Was there any history of breathlessness/ difficulty in breathing for a long time? (because of which he could not work.)

   E Yes (----------------------)   No (   ),   don't know ( )   ,

23. Was there any history of cough for a long time?

   E Yes (----------------------)   No (   ),   don't know ( )   ,

24. Did the patient sit day and night because of breathlessness? Was he not able to sleep in the supine position?

   C Yes (----------------------)   No (   ),   don't know ( )   ,

25. Did the patient had cough with white expectoration for at least two months every year, for three consecutive years?

C Yes (----------------------)   No (   ),   don't know ( )

Did the cough increase during cold/winter?

   C yes----------------------   No (   ),   don't know ( )

   S yes -------------------- _   No (   ),   don't know ( )

26. Did the patient's lips, palms and soles turn blue/cyanosed ?

   C Yes (----------------------)   No (   ),   don't know ( )

27. Did the patient has frequent breathlessness?

   S Yes (----------------------)   No (   ),   don't know ( )

28. Was the patient addict to smoking chillum/Bidis/cigarettes?

C Yes (----------------------)   No (   ),   don't know (   )

> COAD
> Possible = E1+ 1S / 1E + 1C
> Most probable = 2E + 2C / 1E +1C +2S / 1E +1C+3S

(Questions 22 to 28)

Annexure 2

महान ट्रस्ट, कममग्राम उत⚬ावली, म⚬ेलघाट

¼ ctk**t** v⅝Ws fyfeVsM vk§j vkfnokl⅝ fodk**1** foHkkx] e- 'kk- ds **1**kStU; **1**½

(Verbal Autopsy Form)

१६ – ६० वषे पयंत मृत्यु सवेक्षण (कारणममा⚬ांसा)

ददना⚬ांक: पⲟावतⲟी क्र.

गा⚬ा◌ंव	घर	पररवार	व्यक्त⚬ी

पहचान क्रमा⚬ांक   ( )( )( ) — ( )( )( ) — ( )( )( )( )( )( ) — ( )( )

१) मृतक का पूरा नाम :_____मपता का नाम_____जाटो _____

२) जन्मतार⚬ीख (पता ह⚬ै त⚬ो): ( ) ( )/ ( ) ( )/ ( )( )( )( ) (ददन /ममहन⚬ा/स⚬ाल) ३) ललग: पुरुष ( )स्त्र⚬ी ( )

४) ग⚬ा◌ां◌ंव क⚬ा न⚬ाम (हमेश⚬ा रहन⚬ेक⚬ा) : _____

५) मरन⚬े दक त⚬ार⚬ीख : ( ) ( )/ ( ) ( )/ ( )( )( )( ) (ददन /ममहन⚬ा/स⚬ाल)   ६)मृत्यू क⚬े समय उम्र: ( )( )( )

७) जहा⚬ाँ मृत्यू हुआ वह गा⚬ा◌ँव का नाम : _____

८) मुलाखत दक तारिख: ( ) ( )/ ( ) ( )/ ( )( )( )( ) (ददन /ममहना/साल)

९) मरने का कारण :-

---

१)- क⚬ैस⚬ा क्या मर गया? क्य⚬ा तकलीफ हुई थी यह समवस्⚬तर बताइय⚬े| बत⚬ाय⚬ा हुआ वण⚬ा◌न ॿलमखए| बाहरक⚬ी ॿबम⚬ार⚬ी ह यह कारण न बताते हुए क्या तकलीफ थी, यह समजाने में मदत दकजीये|

_____
_____
_____
_____
_____
_____
_____
_____
_____

१०) क्या ममहला अरोग्यदत उपमस्थत थी?   हा (----------------) नहीं (----------------)

- -- - - - -

११)   वाले का नाम:- _____ मत *क के साथ ररश्ता:* _____

जानकारी दन

सचना:-

१) कोई भी सवाल के सामने (----------) जगह रहने पर, वह तकलीफ मरने के दकतने ददन पहले से थी,(तकलीफ एकददन से कम समय रहने पर) दकतने घांटो से थी यह मलखये|

२) बड़े करिन सवालो का भाग करके दो –मतन सवालों द्वारा जानकारी पुयीये|

I) क्या मररज नीचे मलखे दकसी कारण से मर गया|

१) अपघात ( )   २) पानी में डूबकर ( )   ३) चोट ( )

४) मगरने से ( )   ५) साांप काटने से ( )   ६) जहर खाने से ( )

५) जगली जानवरों ने मारा ( )   ८) खून हुआ ( )   ९) खुद कु शी कीयी

( ) C. हाां. (----------------------)   नही ( )

पता नही ( )

```
अपघात वगै २७
बहुते   = 1  C
```

- - - - - - - - - -

II) सास दक मबमारी

1. क्या मररज को खाांसी थी?

   हाां. (----------------------)   नही ( )   पता नही ( )

2. क्या मररज को दम लगता था? साांस फु लती थी? क्या मररज को साांस लेने में कोई ददक्कत थी?हाां. (----------------------)   नही ( )   पता नही ( )

   यदी दोनों नहीं तो III पर जाइये|

   एक या दोनों हाां होंगे तो सवाल ३ से ७

पुमयये|3. खाांसी कब से थी? (-----------)

   E (२४ घांटों से ज्यादा)

4. क्या खाांसी में लाल (गांजने जैसा) फे फड़ा जाता था?

   C हाां. (----------------------)   नही ( )   पता नही ( )

5. दम/साांस फु लना कब से था? (----------------------)

   C (६ घांटो से ज्यादा)

6. क्या मररज बुखार था?

   S हाां. (----------------------)   नही ( )   पता नही ( )

7. क्‍या सीनी/पासलीया अंदर खचती जती थी?

    C हाँ. (---------------------)   नही ( )   पता नही ( )

8. क्‍या सीने में दद था?

    C हाँ. (---------------------)   नही ( )   पता नही ( )

क्या साँस लेने से बढ़ता था?

    C हाँ. (--------------------)   नही ( )   पता नही ( ) (दोनो में से दकतने भी S होने पर 1S)

नयु ोमनया
  सांभव = 1E + 1S
  बहुदा = 1E + 1C + 2 S अथवा 1E + 1S + 2C

सवाल 3 से 6 में तकलीफ (खाँसी या बुखार) 15 ददन से ज्यादा समय तक होंगी तो सवाल 9 से २५ तक पुयीये| यदी नहीं होंगी तो III पर जाइये|

9. क्या खाँसी कब से थी? (---------------------)

    E हाँ (यदी 15 ददनसे ज्यादा होगा, तो 1E)   नहीं ( )   पता नहीं ( )

10. क्या खाँसी में खून जाता था?

    C हाँ (----------------------)   नही ( )   पता नही ( )

11. क्‍या मररज ददन ब ददन सुखता जा रहा था? और वजन घटते जा रहा था? (गत 15 ददन से ज्यादा समय से सतत) E हाँ (----------------------)   नही ( ) पता नही ( )

12. आमखर 15 ददन में मररज की तबीयत कैसे थी?

    E मबमारी थी? (----------------------)   अच्यी थी ( )   पता नही ( )

13. क्या मररज को एक माह से बहोत कमजोरी आयी थी?

    S हाँ (---------------------)   नही ( )   पता नही ( )

14. मरने के पहले 30 ददन के अंदर तक मररज का खाना कैसे था?

    S कम (---------------------)   अच्या ( )   पता नही ( )

15. क्‍या मररज को T.B. (क्षयरोग/सुखी) की मबमारी थी?

S हाॅ (----------------------)   नहीं ( )   पता नही ( )

16. क्या T.B (क्षयरोग) के मररज के साथ इस मरीज का संपक (साथ) आया था?

    S हाॅ (----------------------)   नहीं ( )   पता नही ( )

17. क्या मरीज को T.B. की लस (मब.सी.जी.) लगाई थी?

    हाॅ (----------------------)   S नहीं ( )   पता नही ( )

18. क्या मरीज के गले/ काख में 15 ददन से ज्यादा समय तक गिान थी?

    C हाॅ (----------------------)   नहीं ( )   पता नही ( )

19. क्या मरीज को 15 ददनसे ज्यादा समय तक गदन| मसर में दद और उलरटया थी?

    S हाॅ (----------------------)   नहीं ( )   पता नही ( )

20. क्या मरीज के आवाज में बदल, घोगरेपन तथा मनगलने में तकलीफ होती थी?

    S हाॅ (----------------------)   नहीं ( )   पता नही ( )

21. क्या दम/सांस फुलना/ पसमलया अांदर मखचाी जानाा था? और कबसे?

    C हाॅ (----------------------)   नहीं ( )   पता नही ( )

T.B.
स वता = E1+ 1S +1C/ 2E + 3S
बहुदा = 3E + 2C अथवा 2E + 1C +5S
         अथवा 2E + 2C +2S

(सुचना:15 ददनसे १ माहके ऊपर खाॅसी

फुलना रहनेपर T. B. की सभावना ज्यादा ह)

22. क्या मरीज को बहोत ददन से दम लगता था? या सांस फुलती
थी?(मजसके वजह से वह काम नहीं कर सकता था)

    E हाॅ (----------------------)   नहीं ( )   पता नही ( )

23. क्या मरीज को बहोत ददन से खाॅसी थी?

    E हाॅ (----------------------)   नहीं ( )   पता नही ( )

24. क्या मरीज दम के वजह से ददन रात बैिा रहता था? सो नहीं सकता था?

    C हाॅ (----------------------)   नहीं ( )   पता नही ( )

25. क्या मरीज को लगातार तीन साल से प्रत्येक वषम हररोज दो माह तक खाॱॉसी में सफ़े द मचकट बलगम फे फड़ा आता था?

    C हाॱॉ (------------------)   नहीं (   )   पता नही (   )

    क्यॱॉ वह खाॱॉसॱी थॱॉडॱी के ददनों
    बढतॱी थॱी?

    S हाॱॉ (------------------)   नहीं (   )   पता नही (   )

26. क्या मरीज के ओि, पैर, नीलें हुयें थे?

    C हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

27. क्या मरीज को बार-बार दमा होता था?

    S हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

28. क्यॱॉ मरॱीज कॱो ददन सॱे ॿबडॱी/ॿचलम/ॿसगॱॉरेॱट ॿपनॱे कॱी आदत थी?

    C हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

> **COAD**
> स वतॱॉ = E1+ 1S / 1E + 1C
> बहृदा = 2E + 2C / 1E +1C +2S / 2E +1C+2S

     (सवाल 22 से 28 तक)

III) हृदयरोग (IDH)

1. क्यॱॉ मरॱीज कॱो सॱीनॱे में (बॱॉयॱॉ ॿहस्सॱॉ/ ॿबचमें) दद
   हुआ थॱॉ| (वजन रखॱॉ जैसॱे लगतॱॉ थॱॉ?)

    E हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

2. क्यॱॉ मरॱीज के सॱीनॱेमॱेंॱ घुटन जैसॱे महसुस हुआ? यॱॉ घबरॱॉहट हॱो रहॱी थॱी? जॱो कम करनॱे
से बढतॱी थॱी? और आरॱॉम करने से कम होती थी?

    C हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

3. क्यॱॉ सॱीनॱे कॱॉ दद बाये हॱॉथ मॱेंॱ गया थॱॉ?

    C हाॱॉ (---------------------)   नहीं (   )   पता नही (   )

4. क्या मरीज को बहोत पसीना आता था?

   S हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

5. क्या मरीज को चलने से कम करने से या सीडी चढ़ने से दम लगता था?

   S हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

6. क्य◌ा मर◌ीज चक्कर आक◌े ◌ागर गया थ◌ा?

   S हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

7. क्या मरीज की ददल की धड़कन बढ़ती थी?

   S हा◌ाँ (-----------------)   नहीं (   )   पता नही (   )

8. क्या मरीज को उलटी हुई थी?

   S हा◌ाँ (-----------------)   नहीं (   )   पता नही (   )

9. क्य◌ा मर◌ीज क◌ो त◌ांबाख◌ू, ◌बड◌ी,मचलम, ◌सग◌ार◌ेट य◌ा ग◌ा◌ां◌ज◌ा ◌पन◌े क◌ी आदत थी?

   S हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

10. क्या मरीज को पैर से उपर तक सजन (उलटी सजन) आई थी?

   S हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

हृदयरोग (IDH)
स ◌वत◌ा = 1E+ 1S / 1E + 1C
बहुदा = 1E + 1C + 2S / **या** 2C **अथवा** 1E +2C

IV) पतली दस्त (दस्तकी बीमारी)

1. क्य◌ा मर◌ीज क◌ो पतली त◌ृ◌ी ह◌ोत◌ी थी?   ह◌ा◌ाँ (--------------) नह◌ी◌ं (   )

                             पत◌ा नह◌ी (   ) यद◌ी ह◌ा◌ाँ, त◌ो एक ददन में और र◌ात में ज्याद◌ा स◌े ज्याद◌ा दकतन◌े बार? ◌तन बार य◌ा उसस◌े कम ह◌ोन◌े पर V पर जाइय◌े| E एक ददन में और रात तीन से ज्यादा बार पतले दस्त होने पर, सवाल 2. पुमयये|

2. क्य◌ा त◌ृ◌ी में खुन य◌ा बह◌ोत ऑव ◌ागरत◌ी थ◌ी?

   C हा◌ाँ (---------------------)   नहीं (   )   पता नही (   )

<table>
<tr><td>मडसट्रें </td></tr>
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```
मडसट्रें
बहुत = 1E + 1C
यदी हा तो V1 पर जाइये
यदी पता नहीं तो सवाल 3 पमू यय
```

3. दकतने ददन से पतली दस्त शुरू थी? (------------------------------)

```
लंबी हगवन|पतली दस्त
बहुत = 1E + 1C
मसफ सवाल 1 और 3 क मलय।
```
C १५ ददन से ज्यादा ददन तक

१५ ददन से कम समय होगा तो सवाल ४ से ११ पूमयये।

4. क्या दस्त पाणी जैसे पतली (ढाळ) होती थी?

   C हा (-----------------)   नहीं ( )   पता नही ( )

5. क्या मरीज को उलटी होती थी?

   S हा (-----------------)   नहीं ( )   पता नही ( )

6. प्यास कैसी थी?

   C बढ़ गई थी (----------------------)   नहीं ( )   पता नही ( )

7. क्या आँखे गहरी अंदर गई थी?

   C हा (----------------------)   नहीं ( )   पता नही ( )

8. आखरी दो ददनमें दकतनी पेशाब होती थी?

   C कम|कुय भी नहीं (----------------------) हमेशा जैसी ( )   पता नही ( )

9. पेशाब का रंग कैसा था?

   C गद या बहोत मपली (----------------------) हमेशा जैसी ( )   पता नही ( )

10. क्या मरीज को दस्त के समय पानी/ शरबत/ जीवनरक्षक घोल मपलाना शुरु रखा था?

   बहोत (----------------------) S कम   नहीं ( )   पता नही ( )

```
नतली दस्त
संभव = 1E
बहुते = 1E + 2C या 1E + 1C + 2S
```

v) रॅबीज

1. क्या मरीज को कुत्ते, जांगली जानवर ने, कटा था?

   E हाॅं (----------------------)   नहीं ( )   पता नही ( )

2. क्या मरीज मरने से कुय ददन पहले पानी पीनेसे घबराता या डरता था? डर के वजह से पानी नहीं मपता था? C हाॅं (----------------------) नहीं ( ) पता नही ( )

3. क्या मरीज मरने से पहले हवा से डरता था?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

  * यदी 1 भी हाॅं होगा तो 4 से 11 तक सवाल पुयीये।

  * यदी सभी नहीं होंगे तो VII पर जाइये।

4. क्या मरीज मरने से पहले पागल जैसे करता था? काटता था?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

5. क्या मरीज मरने के कुय घांटे बहोश हुआ था या मबलकुल शाांत हुआ था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

6. क्या मरीज को मजस जगह कुत्ते ने कटा था वहाॅं इज आग/जलन/स्पशमवेदना होना या स्नायुदक हलचल थी? C हाॅं (----------------------) नहीं ( ) पता नही ( )

7. क्या मरीज के मुॅंह से फेस मनकलता था?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

8. प्रकाश, स्पश या आवाज से क्या मरीज डरता था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

9. क्या मरीज मबच-मबचमें मानमसक रुपसे मवकलाांग होता था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

10. क्या मरीज को दो-दो चीजे दिखती थी? क्या मरीज का चेहरा मतरया था?

    S हाँ (----------------------)   नहीं (   )   पता नही (   )

11. क्या मरीज को निगलने में दिक्कत होती थी?

    S हाँ (----------------------)   नहीं (   )   पता नही (   )

+---+
| **रँबीज** |
| संभव = 1E + 1C / 1C +2S |
| बहुते = 1E + 3C या 1E + 2C + 2S/3C+3S |
+---+

VII) एड्स

1. क्या एक माह से ज्यादा ददन तक बुखार था?

    E हाँ (----------------------)   नहीं (   )   पता नही (   )

2. क्या मरीज का वजन आखरी य माह में १०% (दस प्रतिशत) से ज्यादा कम हुआ? (सुखी की बिमारी थी? E हाँ (----------------------) नहीं (   )   पता नही (   )

3. क्या मरीज को मरने से पहले एक माह से ज्यादा समय से लगातार पतली दस्त शुरु थी?

    E हाँ (----------------------)   नहीं (   )   पता नही (   )

4. क्या मरीज को 1 माह से ज्यादा समय तक खाँसी थी?

    S हाँ (----------------------)   नहीं (   )   पता नही (   )

5. क्या मरीज को नामगन की बिमारी (चमड़ी पर अंगार,लालसर चट्टे और पानीवाले फोड) थी?

    C हाँ (----------------------)   नहीं (   )   पता नही (   )

6. क्या मरीज के जबान (जीभ) पर सफ़ेद दाग (बुरशी) आयी थी?

    C हाँ (----------------------)   नहीं (   )   पता नही (   )

7. क्या मरीज को टी.बी. की बिमारी थी?

    C हाँ (----------------------)   नहीं (   )   पता नही (   )

8. क्या मरीज को पेशाब की जगह हमेशा फोड़ा/फसली होती थी?

    S हाँ (----------------------)   नहीं (   )   पता नही (   )

9. क्या मरीज के पेशाब से सफ़ेद मपप जाता था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

10. क्या मरीज के शारीर पर बहोत गिाने आयी थी?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

11. क्या मरीज वेश्या के साथ या मववाहबाह्य सांभोग करता था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

12. क्या मरीज को मरने के एक साल पहले कभी खुन लगाया/चढ़ाया था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

13. क्या मरीज के पत्नी/पत्ती को या बच्चे को एड्स की मबमारी है

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

14. क्या मरीज को पीमलया था?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

15. क्या मरीज को भूख नहीं लगती थी?

   S हाॅं (----------------------)   नहीं ( )   पता नही ( )

एड्स

संभव = 2E + 2S या 2E + 1C

बहुत = 3E + 1C या 3E + 2S

या   2E+2C+3S अथवा   2E+1C +5S

VII) धनवात

1. क्या मरीज को झटके/फीट (दाटी) आये थे? कब?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

2. क्या मरीज का शरीर कड़क हुआ था? और धनुष्यबान जैसे पीये झुका?

   C हाॅं (----------------------)   नहीं ( )   पता नही ( )

3. क्या मरीज मुुँह हमेशा जसे पूरी तरह से खोल नहीं सकता था?

हाँ (---------------------)   E नहीं (----------------------)   पता नही (   )

क्या मरीज की दातखील लगातार बैठी?

E हाँ (---------------------)   नहीं (   )   पता नही (   )

एक भी बिमारी का लक्षण नहीं होगा तो VIII पर जाईये| और एक भी बिमारी का लक्षण होगा तो सवाल से 4 से 14 तक पूछिये|

4. क्या मरीज के झटके आवाज या प्रकाश बढ़ते थे?

S हाँ (---------------------)   नहीं (   )   पता नही (   )

5. क्या मरीज आखरी क्षण तक होश में था?

C हाँ (---------------------)   नहीं (   )   पता नही (   )

6. क्या मरीज को लोहे की चिज (जांग खायी हई)/ कांटा चुभा था? या मरीज को चोट आकर जखम गांदी हुई थी? क्या गभमवती महीला की जचकी के समय नल गांदी अवजार से काटी थी? काटने के बाद उस जगह पर गोबर लगाया था?

S हाँ (---------------------)   नहीं (   )   पता नही (   )

7. क्या लोग इस बिमारी को धनुवामद बोलते है

S हाँ (---------------------)   नहीं (   )   पता नही (   )

8. क्या मरीज को धनुवामद के रटके नहीं मिले थे?

हाँ (---------------------)   E नहीं (   )   पता नही (   )

9. क्या मरीज को निगलने में तकलीफ होती थी?

S हाँ (---------------------)   नहीं (   )   पता नही (   )

10. क्या मरीज का पेट बहुत कड़क था?

S हाँ (---------------------)   नहीं (   )   पता नही (   )

11. क्या मरीज का चेहरा पुतले के जसे हुआ था?

S हाँ (---------------------)   नहीं (   )   पता नही (   )

12. क्या मरीज का चेहरा, मसना, कमर, पेट कड़क थे और हाथ पैर सही थे?

S हा॒ॉ (---------------------)   नहीं (   )   पता नही (   )

13. क्या मरीज का शरीर का कोई भाग जल गया था? कान में से मपप बहता था? ऑपरेशन हुआ था? मरने के पहले(15 ददन के अ॑ांदर) जचक॒ी हु॒ई थी? म॒नजमत॒ुक नह॒ी॑ां दकये॑ हु॒ये॑ इजेक्शन लेन॒े क॒ी आदत थ॒ी?

S हा॒ॉ (---------------------)   नहीं (   )   पता नही (   )

```
         धनर॒ु
          ॒ॉद
संभव = 1E + 1C  अथवा  1C + 2S
```

VIII) मपलीया/कावीळ

1. क्या मरीज की आँखे मपली थी?

E हा॒ॉ (---------------)   नहीं (   )   पता नही (   )

2. क्या मरीज की पेशाब मपली थी?

E हा॒ॉ (-----------------)   नहीं (   )   पता नही (   )

3. क्या मरीज को उलटी जैसे लगता था?

S हा॒ॉ (------------------)   नहीं (   )   पता नही (   )

4. क्या मरीज को बार –बार उलटीया होती थी?

S हा॒ॉ (----------------)   नहीं (   )   पता नही (   )

5. क्या मरीज को बुखार था?S

हा॒ॉ (---------------------)   नहीं (   )   पता नही (   )

6. क॒य॒ा मर॒ीज के॒ प॒ेट
दद थ॒ा? S हा॒ॉ (------)   नहीं (   )   पता नही (   )

7. क॒य॒ा मर॒ीज क॒ो भ॒ुख नह॒ी॑ां लगत॒ी

थी?

  S हाॅं (---------------------)   नहीं (   )   पता नही (   )

8. क्या मरीज का वजन कम हो रहा था?

  S हाॅं (---------------------)   नहीं (   )   पता नही (   )

9. क्या मरीज को मरने के एक माह पहले खुन लगाया?

  S हाॅं (---------------------)   नहीं (   )   पता नही (   )

10. क्या मरीज को बहोत दारू पिने की आदत थी?

  S हाॅं (---------------------)   नहीं (   )   पता नही (   )

11. क्या पेट में गोला था?

  S हाॅं (---------------------)   नहीं (   )   पता नही (   )

पलीया
संभव = 1E
बहुते = 2E + 3S/ 1E +5S

IX) मद्र (ममस्तष्क) पर सजन

1. क्या मरीज बहोत सुस्त या बेहोश था?

  नहीं (   )   S हाॅं(---------------------)   पता नही (   )

2. क्या मरीज को झटके/दाटी आई थी?

  C हाॅं (---------------------)   नहीं (   )   पता नही (   )

3. क्या मरीज को बहोत (मनरथमक) करता था? या पागल जैसे बाते करता था?

  नहीं (   )   C हाॅं(---------------------)   पता नही (   )

4. क्या मरीज को बुखार था?

  E हाॅं (---------------------)   नहीं (   )   पता नही (   )

5. क्या बुखार के साथ पसीना आता था?

6. क्या बुखार के साथ पसीना आता था?

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

7. क्या लगातार सरदद और उलरटयाँ होती थी?

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

8. क्या प्रकश मरीज को सहन नहीं होता था? आँखोंपर प्रकाश डालने के बाद वह तरत आँख बांद कर लेता था?

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

9. क्या मरीज के कान से पपप निकलता था?

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

10. क्या   कड़क   या   तालि   रहती   पीये पीये जाती थी?
गदन   थी? या गदन

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

11. क्या मरीज को बुखार के साथ खाँसी,दम, पेशाब में जलन पेट में दद, इत्यादी होता था?

   S हाँ (----------------------)   नहीं (   )   पता नही (   )

   ┌─────────────────────────────────────┐
   │   **पलीयग**   │
   │ संभव = 1E +1C /1E + 5S   │
   │ बहुते = 1E + 2C या 1E +1C+5S   │
   └─────────────────────────────────────┘

12. क्या मरीज का एक हाँथ और एक पैर कमजोर हुआ था? (वह हाँथ,पैर महला
   नहीं सकता था?) C हाँ (----------------------)   नहीं (   )   पता
   नही (   )

13. क्या मरीज का मुँह तेढा हुआ था?

   C हाँ (----------------------)   नहीं (   )   पता नही (   )

CVE (मस्तिष्क मे॒ें खु॒ की ॒बम॒ार॒ी)
संभव = 1C

X) ॲनेममया (खुन की कमतरता)

1. क्य॒ा मरन॒े के पहले मर॒ीज क॒ी जबान,ओ, आँखे क॒ी पलक॒े (अ॒ंदरस॒े), ह॒ाथ क॒े तलवे, न॒ाखुन वैगर॒े सफ़॒ेद हुए थ॒ा गुलाबी नहीं थे?) (लाल

E ह॒ाँ (--------------------)   नहीं ( )   पता नही ( )

2. क्या मरने के य दिन पहले से मरीज के शरीर के किसी भी अवयवसे (चमड़ी,तृी, पेशाब, उलटी,बच्चेदानी) खुन बह रहा था? क्या चमड़ीमें खुन के दाग (लाल, हरे, नीले) थे? क्या डाम्बर जैसी कमल, मचकट तृी हुई थी?

C हाॅं (--------------------)   नहीं ( )   पता नही ( )

3. क्या मरीज को बहोत कमजोरी (थकान) महसुस होती थी?

S हाॅं (--------------------)   नहीं ( )   पता नही ( )

4. क्या मरीज थोडासा चलने पर या काम करने पर साॅस फुलती थी?

S हाॅं (--------------------)   नहीं ( )   पता नही ( )

5. क्या मरीज को खुन की कमतरता की बिमारी बतायी गई थी?

S हाॅं (--------------------)   नहीं ( )   पता नही ( )

6. क्या मरीज को बार-बार खुन लगाने की (चढ़ाने की) जरुरत पड़ती थी?

C हाॅं (--------------------)   नहीं ( )   पता नही ( )

7. क्या मरीज के तृी में (कृम) मगरते थे?

8. क्या मरीज को मसकलसेल (जोड़ो के दद) की बिमारी थी?

S हाॅं (--------------------)   नहीं ( )   पता नही ( )

```
                        अंे ममयंा
संभव = 1E + 2S / अथवा 1C + 2S
बहुते= 1E = 1C+2S अथवा 1E + 2C अथवा 2C + 2S अथवा 1C+3S
```

XI) मुह का कॅन्सर यंा ककरोग

1. क्या मुह में रिक न होनेवाली ददरमहत जखम (फोड़ा/उज्जु) बहोत दिन से थी।

E हाॅं (--------------------)   नहीं ( )   पता नही ( )

2. क्या मुह में रिक न होनेवाली ददरमहत कोई गितान आयी थी।

E हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

3. क्या मुह के गा⬡न या जखम से खाना निगलने में कोई तकलीफ थी|

S हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

4. क्या मुह के गा⬡न या जखम बहोत गंदा बास आता था?

S हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

5. क्या मरीज के मुह में सफ़ेद दाग (   ) आया और दफर गा⬡न| फोड़ा जखम तैयार हुई|

C हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

सब नहीं होंगा XII पर जाइये| एक भी हा⬡ँ होंगा तो सवाल 6 से 9 तक पूयीयें|

6. क्या मरीज का वजन ददन ब ददन कम होने जा रहा था? (क्या मरीज ददन ब ददन सुख रहा था?) C हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

7. क्या मरीज की भुख बहोत कम हुई थी?

S हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

8. क्या मरीज के जखम से खुन बहता था?

S हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )

9. क्या मरीज को तम्बाखु, बीडी या मचलम, दारू सेवन करने की आदत थी?

S हा⬡ँ (----------------------)   नहीं (   )   पता नही (   )
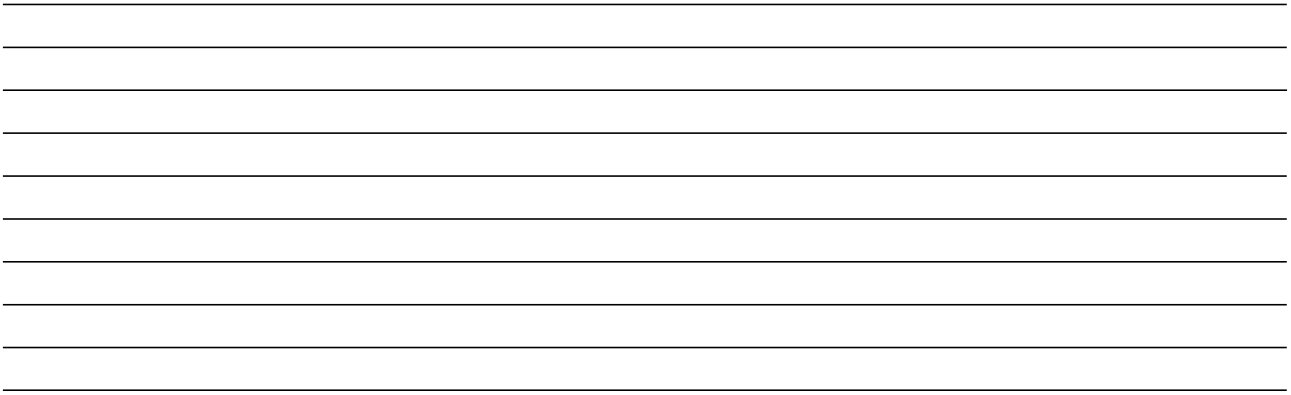
यदी हा⬡ँ तो कौनसी आदत थी? (--------------------------)

मुⷠ का कन्सर
संभव = 1E + 1S
बहुते = 1E = 1C+1S अथवा 1E + 4S OR 2E + 2S

XII) क्या और दसरी कोई तकलीफ थी?

कौनसी

_____

_____
_____
_____
_____

अन्य _____

वजह	पता	नहीं

ईल॰ज दकय॰ा क्या?

हा॰ॉ ( )   नहीं   (
)   पता   नहीं   (
)यदी हा॰ॉ तो,

दकसने---

कहा॰ॉ--

क्या ईलाज दकया   --

मबमारी कौनसी बताई? --

पयमवेक्षक/मागमदशाक क॰ा मनष्कषम

1) --

2) --

3) --

4) --

5) --

1.	मतृ क के	नाम	सही / अघि॰॰ा
	माता		

मपता		
पमत		
पमत्र		
लड़का		
लड़की		
(दकसी दो का)		

सह◌ी/ अघ◌र्◌ा

2. सरपांच का नामः--   ----------------------

सह◌ी/ अघ◌र्◌ा

3. पोलीस पटेल का नामः --   ----------------------

सही/ अघ◌र्◌ा

म◌ागमदशमक / पयमवेक्षक क◌ा न◌ामः---   --------------------------------------

ददनाक :   /   / २०

MAHAN TRUST, KARMGRAM UTAVALI, MELGHAT

पहचान क्रमाांक   ( )( )( ) – ( )( )( ) – ( )( )( )( )( )( ) –
( )( )

१) मृतक का पूरा नाम : _____ पिता का नाम _____ जाति _____

२) जन्मतारीख (पता है तो): ( ) ( )/ ( ) ( )/ ( )( )( )( ) (दिन /महिना/साल)   ३)
लिंग: पुरुष ( )स्त्री ( )

४) गाांव का नाम (हमेशा रहनेका) : ___   ५) जहा मृत्यू हुआ वह गाांव का
नाम : _____

६) मरने दक तारीख : ( ) ( )/ ( ) ( )/ ( )( )( )( ) (दिन /महिना/साल)   ७)मृत्यू के समय
उम्र: ( )( )( )

	Inference on causes of death	Possible	Most probable	Disease code
1)	Pneumonia			
2)	Tuberculosis			
3)	COAD			
4)	IHD			
5)	Dysentry			
6)	Chronic diarrhoea			

7)	Acute diarrhoea			
8)	Rabies			
9)	AIDS			
10)	Tetanus			
11)	Jaundice			
12)	CNS infection			
13)	CVE			
14)	Fever cause unknown			
15)	Anemia			
16)	Oral cancer/malignancy			
17)	Other			
18	Cause not Known			

Underlying Cause _____ ( )_____

Singnature:_____