The pattern of life events preceding suicide among the elderly in rural China: a national case-control psychological autopsy study

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Research article

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Abstract

Background Life events associated with an increased risk of suicide and prior to the suicide in China different from those in Western countries. But there is a lack of summary of the elderly life event patterns on Chinese suicide. The aim of this study was to identify the pattern of life events which precede suicide among the elderly in a Chinese culture context.

Methods A two-stage stratified cluster sampling method was used in order to select research sites and 12 counties were randomly selected to recruit cases within three provinces. A case-control psychological autopsy study was then adopted. The study population consisted of 242 suicide cases each with an age of 60 and above, and 242 age-, sex-, and location-matched community living controls. During face-to-face interviews, the information from subjects and proxy informants was obtained by standardized trained investigators. Life events were measured using a 46-item Life Event Scale for the Elderly (LESE).

Results About 99.6% of suicides and 88.4% of controls resulted from the experience of at least one life event. The elderly who had committed suicide experienced more long-term life events. The top three most frequent life events were being diagnosed with chronic disease, hospitalization, and being diagnosed with terminal illness. Women more often experienced the death of spouse, while men experienced more hospitalization, and were more likely to be diagnosed with terminal illness and suffer family poverty. The risk of suicide among the elderly who experience life events was 12.8 times higher than that in people who did not experience life events. The elderly who were having unstable marital status, suffering from physical diseases and diagnosed with mental disorders, are more likely to commit suicide.

Conclusions Understanding the pattern of life events which precede suicides among the elderly in rural China plays an important role in the prevention of suicide. Several different long-term life events can lead to suicidal behavior, and the effect of life events on suicide is cumulative. Being diagnosed with a serious disease may be one of the risk signals for suicide among the elderly.

Background

Suicide is a major public health and mental challenge for people all over the world. The global crude suicide rate was 10.6 per 100,000 in 2016. Suicide rates are highest in people who are aged 70 years or over for both men and women in almost every region in the world [1]. In China, the age-standardized suicide rate was 8.0 per 100,000 in 2016 [2] and was also the highest among people over 60 years of age. In the age groups 60-69, 70-79, 80+, the suicide rates were 23.4, 44.0, and 61.3 per 100,000 respectively, which are almost 3 to 8 times higher than the rates among the general population [3]. Furthermore, the suicide rates in Chinese rural areas are considerably higher than those in urban areas [4]. Because of the pressure of an aging population currently, perceptions of suicide prevention towards older adults in rural China are particularly vital.

Many risk factors contribute to suicide, and life event is one of the highly significant risk factors for suicide [5]. Most people have experienced life events such as financial strain, diseases or the loss of a loved one [6]. Life events such as family problems, work stress and physical diseases are the major life events most people experience [7]. Psychological strain which can result from major life events was
reported to be a high-risk factor for Chinese suicide [8-10]. The noted imbalance in the stress system may reflect a sensitization for experiencing new stressful situations, which can lead to attempted suicide [11].

Frequency of life events also related to the risk of suicide. The previous study had reported that the suicide risk increased due to the frequency of life events [12]. People who experienced more life events were therefore more likely to commit suicide. Routine risk assessments of vulnerable groups and an assessment of the variety of events which may indicate individuals who may be at immediate risk were necessary [13].

The relationship between life events and suicidal behavior among vulnerable people has been well studied. However, there are few studies which focus on life events among Chinese elderly who have committed suicide. The aim of this study was to assess the pattern of life events which preceded suicide among Chinese elderly living in rural areas in order to provide greater evidence in which could be used for suicide prevention.

**Methods**

**Participants and procedures**

A two-stage stratified cluster sampling method was used in order to select research sites and 12 counties were randomly selected to recruit cases in Shandong, Hunan and Guangxi Province, which are top 10, 11–20, and 21–31 provinces ranking of GDP per capita, respectively. A case-control psychological autopsy study [14, 15] was conducted to collect targets’ information from June 2014 to September 2015.

All village doctors and local public health professionals involved in death certification were given brief training and required to report all elderly suicide death to local Centers for Disease Control and Prevention (CDCs) before the study begins. The investigators were composed of the teachers and the graduate students from Shandong University, Central South University and Guangxi Medical University. All investigators were trained intensively for 10 days in a standardized way on the instruments and the skills of the interview. The manner of death was determined by the investigators.

In each county, suicide cases aged 60 and above were collected consecutively based on the death certification system. Age (± 3years)-, sex-, and location-matched living people were selected as the community control group. For every target, two informants were selected. Generally, the first informant was one next-to-kin who lived with the targets; and the second informant was always a friend, a neighbor, or a remote relative. It means there were 5 interviews in one pair of case-control. We did 1210 interviews in total for the 242 completed suicides and living controls. The survey was conducted in face-to-face interviews. The average interview time was 90 min.

The study was approved by the IRB of the Shandong University, Central South University, and Guangxi Medical University. The aim and procedure of the research were explained to all participants. Written
informed consent must be obtained before interviews were conducted.

**Measurements**

**Demographic characteristics**

Demographic data were collected including age, sex, marital status, family income, physical disease, mental disorder, and living arrangements. In the study, people that were married and living with a spouse, or cohabitating were classified as “stable”, while people with other marital status were classified as “unstable”.

**Life Event Scale for the Elderly (LESE)**

In this study, life events were measured by the LESE, which was developed specifically for older Chinese adults [16]. It is a validated and reliable scale used among the elderly generally, and in particular, elderly people who are suicidal [16, 17]. We divided 46 life events into three separate categories: (1) Health/Hospital, 16 items; (2) Family/Home, 18 items; (3) Friends/Relationships, 12 items. Each of the 46 life event items was recorded for five questions: (1) The date it happened, measured by never occur, in one month or one year or long term; (2) Whether it was positive or negative for the target person; (3) The impact to the target person’s mental health, measured by a five-point scale from no impact to very severe impact; (4) The duration of the event, measured by a four-point scale from three months, six months, less to one year or longer; (5) The number of times it happened.

**Statistical analyses**

The information which was provided by two informants was combined as proxy data for the suicide victims and living controls, and this proxy data was then used. For demographic characteristics, the information provided by the first informant was relied on. Answers which were associated with an increased risk of suicide were used when two informants reported differently for each item of LESE. The rationale for this practice is that a targeting behavior may exist as long as one of the two informants has observed it.

The t-test and chi-square test were used to compare different demographic characteristics between the people who experienced fewer life events and more life events both among suicide victims and living controls, respectively. $\chi^2$ was used to analyze the incidence of 46 life events between suicides and controls. $\chi^2$ was also used to compare the frequencies of top 10 life events between men and women among suicide victims. Logistic regression analysis was used to explore the independent factors for suicides.

All analyses were performed using SPSS 24.0 for Windows (SPSS Inc, Chicago, IL). In the study, statistical significance was determined prior to $P<0.05$.

**Results**
**Number of life events among suicide victims and living controls**

A total of 242 suicide victims and 242 living controls were collected in this study. The median number of life events was 4 (QR=5) among elderly people living in rural areas. As shown in Table 1, suicides and controls were divided into two groups according to the median number of life events they had experienced. Suicides who had been diagnosed with mental disorders or being left-behind by their children were more likely to have experienced life events. Living controls who were older, had an unstable marital status, lived alone, suffered from physical diseases or being left-behind seemed to experience more life events.

**Life events by time among suicide victims and living controls**

The incidences of recent life events during the last 1 month and long-term life events lasting more than 1 year among suicides were 32.6% and 98.3%, while the incidences among living controls were 17.8% and 86.4%. As shown in Table 2, the incidences of recent life events and long-term life events among suicide victims were both higher than those among living controls.

**Life events comparison between suicide victims and living controls**

A total of 46 items of life events were enrolled in the LESE. Most incidences of life events were higher among suicides than among living controls. As shown in Table 3, the incidences of two categories of life events which were Health/Hospital and Family/Home were higher among suicides than living controls. Health/Hospital was the most commonly reported for both suicide cases and living controls (97.5% and 83.9%).

**Frequency distribution of life events by gender among suicide victims**

As shown in Table 4, the top three most common life events among all suicide victims were: being diagnosed with a chronic disease, hospitalization, and being diagnosed with terminal illness. The same three life events were most common among male suicides. For female suicide cases, the top three life events were: being diagnosed with a chronic disease, hospitalization, and the death of spouse. Women experienced the death of spouse more often than men. The frequency of hospitalization, being diagnosed with terminal illness, and family poverty were significantly higher among men than women.

**Risk factors for suicide among the Chinese elderly**

484 elderly were enrolled in the logistic regression model. After adjusting the variables of living alone and being left-behind, the model identified four risk factors which were all significant independent risk factors for suicide in rural area of China. They are presented in Table 5. Elderly people with an unstable marital status, who suffer from physical diseases, are diagnosed with mental disorders or have experienced life events were more likely to commit suicide.

**Discussion**
The major findings in our study were: (1) rural elderly who have been left-behind experienced more life events; (2) the elderly experienced more long-term life events than recent life events; (3) the top three most frequent life events among suicide victims were being diagnosed with a chronic disease, hospitalization, and being diagnosed with terminal illness; (4) experienced life events, unstable marital status, suffering from physical diseases and diagnosed with mental disorders were the independent risk factors for elderly Chinese suicide victims who live in rural area.

The results reveal that being left-behind plays an important role in life events for both suicide victims and living controls. Nowadays, most young people in rural area leave their parents and hometown for a better life. Loneliness and lower social support resulting from being left-behind among the elderly in rural China is increasing, and this is one of the most vulnerable group. They are more likely to experience various life events due to a worse quality of life and smaller social circle, as well as a poorer self-perceived health status [18, 19]. Being left-behind parallels long-term separation and lack of social supports, company, and care from family members, which may well all be profound life events themselves [20].

Long-term life events were more common among elderly suicide victims. The rate of elderly suicide is higher than the young in rural China. Long-term life events may have major psychological effects on the elderly. In our study, there were 238 suicide victims (98.3%) who had experienced long-term life events, while 32.6% of them had experienced recent life events. However, in an early psychological autopsy study among young Chinese people in rural areas, 82.4% of suicide victims had experienced long-term life events and 41.8% had experienced recent life events [21]. Elderly suicide victims had experienced more long-term life events compared with the younger suicide victims. More attention needs to be paid to long-term life events among elderly suicides.

Life events relating to health were more common among the rural elderly. The top three most frequent life events among suicide victims were being diagnosed with a chronic disease, hospitalization, and being diagnosed with terminal illness. When people become old, physical diseases cannot always be avoided due to the natural aging of organs among the elderly. Furthermore, for the rural elderly, a greater numbers of endorsed negative life events is associated with an increase in psychosocial distress and poor pain management [20, 22]. People contemplating suicide are not sensitive to a particular event that triggers suicide, but they are sensitive to a whole set of living conditions, many of which contribute to the behavior of suicide [23].

There are differences between men and women when it comes to life events. Women were more likely to experience the death of spouse due to their higher life expectancy, while men experienced more hospitalization, being diagnosed with terminal illness and family poverty. Financial trouble, work problems and family discord were more commonly reported among male suicides within Western society. In our previous study with a sample of young rural Chinese suicide victims, family poverty and diagnosis of terminal illness were also more frequent items among male suicide victims [10].

Elderly suicide victims were more likely to experience life events, have an unstable marital status, physical diseases, and mental disorders. These risk factors have also been reported in previous studies [24-26].
The elderly were living in worse conditions and this seemed to increase the risk of suicide. Acute stress resulting from life events also increased the risk of suicide. The risk of suicide among the elderly who had experienced with life events was 12.8 times higher than that in people who had not experienced life events. Phillips and his colleagues found that negative life event is a stronger predictor of suicide [27]. In addition, the lack of a spouse or suffering from physical diseases may lead to depression by limiting the availability of social activities available to the rural elderly, which increases the risk of suicide. A stable marital status has a positive impact on the physical and mental health of elderly people, both in terms of life care and emotional well-being [28]. A spouse is always the most important and available caregiver during old age. If divorced or suffering the death of a spouse, elderly people tend to lose spiritual comfort and gain less support than they would from a spouse [29]. In our study, 191 (78.9%) preceding suicides were suffering from some form of physical diseases. Some researchers reported that older adults with chronic diseases had more severe depressive symptoms and had experienced negative life events, and had lower social support and a less positive coping method [30]. Once life suffers a major change, the elderly do not adapt so positively, and it leads to life events and causes psychological strain which can lead to suicide.

There were also some limitations in our psychological autopsy study. Firstly, the recalling bias is an inevitable limitation in such a retrospective investigation when interviewees reported the previous life events. Secondly, we used the proxy data to assess the life events from two informants for suicide victims. Thirdly, the long-term impact of life events had not been assessed. Further studies should focus on the long-term effect of life events on the elderly.

**Conclusions**

The present study demonstrates the characteristics of life events and the relationship between life events and suicide. Understanding the pattern of life events preceding suicide among the rural elderly plays a significant role in suicide prevention. Long-term life events can lead to suicidal behavior, and effect of life events on suicide is cumulative. Being diagnosed with a serious disease may be one of the risk signals for suicide among the elderly. More targeted measures should be paid to the rural elderly who are being left-behind, having an unstable marital status, suffering from physical diseases or have been diagnosed with mental disorders when interventions are being conducted.

**Abbreviations**

LESE: life event scale for the elderly; LE: Life event; CDC: Center for disease control and prevention; QR: Quantile range; cOR: Crude odds ratio; aOR: Adjusted odds ratio

**Declarations**

Ethics approval and consent to participate
The study was approved by the IRB of the Shandong University, Central South University, and Guangxi Medical University. The aim and procedure of the research were explained to all participants. Written informed consent must be obtained before interviews were conducted.

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare that they have no competing interests.

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**Author Contributions**

Zhenyu Ma and Liang Zhou designed the study and oversaw the overall implementation of the study. Qiqing Mo undertook the statistical analysis and wrote the first draft of the manuscript. Guojun Wang and Cunxian Jia supervised the field work in Hunan and Shandong provinces. Lu Niu critically reviewed the first draft of the manuscript and provided useful insights.

All authors contributed to and have approved the final manuscript.

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**Availability of data and materials**
The datasets used during the current study are available from the corresponding author on reasonable request.

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Tables
Table 1 Demographic characteristics between suicides and controls by number of life events (LE)

| Variables                      | Suicide victims | Living controls | \( \chi^2 \) | \( t \) |
|--------------------------------|----------------|-----------------|--------------|--------|
|                                | LE\( \leq 4 \) | LE\( > 4 \)     | n (%)        | n (%)  |
| Age [mean (SD)]                | 73.6(8.6)     | 75.0(8.0)       | 1.268        |        |
|                                | 73.0(8.4)     | 75.8(7.5)       | 2.731*       |        |
| Sex                            | Male          | Female          |              |        |
|                                | 49(50.0)      | 86(59.7)        | 2.235        |        |
|                                | 49(50.0)      | 58(40.3)        |              |        |
|                                | 80(54.4)      | 55(57.9)        | 0.282        |        |
|                                | 67(45.6)      | 40(42.1)        |              |        |
| Marital status                 | Stable        | Unstable        |              |        |
|                                | 52(53.1)      | 70 (48.6)       | 0.462        |        |
|                                | 112(76.2)     | 58 (61.1)       | 6.327*       |        |
|                                | 46(46.9)      | 74 (51.4)       |              |        |
|                                | 35(23.8)      | 37 (38.9)       |              |        |
| Family annual income (yuan)    | 0-3600        | 37(37.8)        | 5.312        |        |
|                                | 28(28.6)      | 60 (41.7)       |              |        |
|                                | 49(33.3)      | 25 (26.3)       | 3.122        |        |
|                                | 33(33.7)      | 33 (22.9)       |              |        |
|                                | 45(30.6)      | 25 (26.3)       |              |        |
|                                | 75(76.5)      | 103 (71.5)      |              |        |
|                                | 14(9.5)       | 21 (22.1)       | 7.384*       |        |
|                                | 20(20.4)      | 20 (13.9)       |              |        |
|                                | 133(90.5)     | 74 (77.9)       |              |        |
| Living alone                   | Yes           | No              |              |        |
|                                | 23(23.5)      | 41 (28.5)       | 0.75         |        |
|                                | 14(9.5)       | 21 (22.1)       | 7.384*       |        |
|                                | 78(79.6)      | 124 (86.1)      |              |        |
|                                | 86(58.5)      | 75 (78.9)       | 10.831*      |        |
|                                | 20(20.4)      | 20 (13.9)       |              |        |
|                                | 61(41.5)      | 20 (21.1)       |              |        |
| physical diseases              | Yes           | No              |              |        |
|                                | 41(41.8)      | 81 (56.3)       | 4.846*       |        |
|                                | 7(4.8)        | 5 (5.3)         | 0.031        |        |
|                                | 57(58.2)      | 63(43.8)        |              |        |
|                                | 140(95.2)     | 90(94.7)        |              |        |
| Mental disorders               | Yes           | No              |              |        |
|                                | 10(10.2)      | 31 (21.5)       | 5.314*       |        |
|                                | 11(7.5)       | 14 (14.7)       | 3.278*       |        |
|                                | 88(89.8)      | 113 (78.5)      |              |        |
|                                | 136(92.5)     | 81 (85.3)       |              |        |

*: \( P<0.05 \)

Table 2 Life events by time among the suicide and the living control

| Time of life events | Suicides | Living controls | \( \chi^2 \) | \( P \) |
|---------------------|----------|-----------------|--------------|--------|
|                     | n (%)    | n (%)           |              |        |
| Number of recent life events |          |                  |              |        |
| 0                   | 163(67.4)| 199(82.2)       | 14.743       | 0.002  |
| 1                   | 48(19.8)| 29(12.0)        |              |        |
| 2                   | 21(8.7)| 10(4.1)         |              |        |
| ≥3                  | 10(4.1)| 4(1.7)          |              |        |
| Number of long-term life events |        |                  |              |        |
| 0                   | 4(1.7)| 33(13.6)        | 44.118       | <0.001 |
| 1                   | 18(7.4)| 36(14.9)        |              |        |
| 2                   | 21(8.7)| 36(14.9)        |              |        |
| ≥3                  | 199(82.2)| 137(56.6)    |              |        |

Table 3 All items of life events comparison between suicides and controls
| Life events                                                                 | Suicides n (%) | Controls n (%) | $\chi^2$ | $P$   |
|----------------------------------------------------------------------------|----------------|----------------|---------|-------|
| Health/Hospital                                                            |                |                |         |       |
| 236(97.5)                                                                 | 203(83.9)      | 26.681         | <0.001  |       |
| 1 Being diagnosed with chronic diseases                                    | 191(78.9)      | 141(58.3)      | 23.977  | <0.001|
| 2 Being diagnosed with terminal illness                                    | 112(46.3)      | 43(17.8)       | 45.187  | <0.001|
| 3 Life threatening illness to parents/spouse/children                      | 48(19.8)       | 63(26.0)       | 2.63    | 0.105 |
| 4 Being injured from accident                                              | 21(8.7)        | 20(8.3)        | 0.027   | 0.87  |
| 5 Family members being injured from accident                              | 27(11.2)       | 24(9.9)        | 0.197   | 0.657 |
| 6 Hospitalization                                                          | 132(54.5)      | 84(34.7)       | 19.264  | <0.001|
| 7 Family members hospitalized                                              | 44(18.2)       | 63(26.0)       | 4.331   | 0.037 |
| 8 Self-caring hard                                                         | 71(29.3)       | 21(8.7)        | 33.551  | <0.001|
| 9 Family members self-caring hard                                          | 20(8.3)        | 16(6.6)        | 0.48    | 0.488 |
| 10 Recovering from illness                                                | 12(5.0)        | 18(7.4)        | 1.279   | 0.258 |
| 11 Family members recovering from illness                                 | 8(3.3)         | 19(7.9)        | 4.746   | 0.029 |
| 12 Life threatening illness to relatives/close friends                     | 5(2.1)         | 13(5.4)        | 3.693   | 0.055 |
| 13 Death of a spouse                                                      | 77(31.8)       | 49(20.2)       | 8.412   | 0.004 |
| 14 Death of a child                                                       | 29(12.0)       | 35(14.5)       | 0.648   | 0.421 |
| 15 Death of a son/daughter- in law                                        | 13(5.4)        | 11(4.5)        | 0.175   | 0.675 |
| 16 Death of a relative/close friend                                        | 14(5.8)        | 32(13.2)       | 7.783   | 0.005 |
| Family/Home                                                                |                |                |         |       |
| 17 Quarreling/Fighting with partner                                        | 32(13.2)       | 10(4.1)        | 12.819  | <0.001|
| 18 Living apart from spouse                                               | 7(2.9)         | 4(1.7)         | 0.531   | 0.47  |
| 19 Legally divorced                                                       | 1(0.4)         | 0(0.0)         | 1.000   |       |
| 20 Being unfaithful                                                       | 4(1.7)         | 0(0.0)         | 0.123   |       |
| 21 Spouse being unfaithful                                                | 2(0.8)         | 1(0.4)         | 0.624   |       |
| 22 Being reconciled with spouse                                           | 0(0.0)         | 1(0.4)         | 1.000   |       |
| 23 Children quarreling with their partner                                  | 23(9.5)        | 6(2.5)         | 10.601  | 0.001 |
| 24 Family poverty                                                         | 67(27.7)       | 60(24.8)       | 0.523   | 0.47  |
| 25 Living alone                                                           | 65(26.9)       | 32(13.2)       | 14.041  | <0.001|
| 26 Crowded housing                                                        | 9(3.7)         | 9(3.7)         | 0.000   | 1.00  |
| 27 Major loss in home/property                                             | 10(4.1)        | 15(6.2)        | 1.054   | 0.304 |
| 28 Children having left home                                              | 65(26.9)       | 69(28.5)       | 0.165   | 0.684 |
| 29 Disobedience of children                                               | 27(11.2)       | 10(4.1)        | 8.457   | 0.004 |
| 30 Daily life out of routine                                              | 29(12.0)       | 4(1.7)         | 20.325  | <0.001|
| 31 Poor relationship with family members                                  | 42(17.4)       | 8(3.3)         | 25.784  | <0.001|
| 32 Children unemployed                                                    | 6(2.5)         | 11(4.5)        | 1.524   | 0.217 |
| 33 Major change in living conditions                                      | 3(1.2)         | 5(2.1)         | -0.724  |       |
| 34 Major improvement in economic status                                    | 1(0.4)         | 3(1.2)         | -0.623  |       |

Table 3 All items of life events comparison between suicides and controls (Continued)
| Life events                          | Suicides n (%) | Controls n (%) | \( \chi^2 \) | \( P \) |
|-------------------------------------|----------------|----------------|------------|-------|
| Friend/Relationship                 | 63(26.0)       | 47(19.4)       | 3.012      | 0.083 |
| 35 Tensions/Quarrying with neighbors| 21(8.7)        | 18(7.4)        | 0.251      | 0.616 |
| 36 Separating/Breaking up with close friends | 1(0.4)   | 2(0.8)         | -          | 0.624*|
| 37 No close friends/Loneliness     | 31(12.8)       | 12(5.0)        | 9.214      | 0.002 |
| 38 Retirement/Leaving the job      | 3(1.2)         | 6(2.5)         | -          | 0.504*|
| 39 Spouse retirement/Leaving the job | 0(0.0)       | 4(1.7)         | -          | 0.123*|
| 40 Having legal trouble            | 3(1.2)         | 6(2.5)         | -          | 0.504*|
| 41 Family members having legal trouble | 3(1.2)    | 7(2.9)         | -          | 0.339*|
| 42 Face-loss                        | 11(4.5)        | 7(2.9)         | 0.493      | 0.483 |
| 43 Being misunderstood/misjudged    | 4(1.7)         | 8(3.3)         | 1.367      | 0.242 |
| 44 Being threatened                 | 8(3.3)         | 4(1.7)         | 1.367      | 0.242 |
| 45 Family members being threatened  | 1(0.4)         | 1(0.4)         | -          | 1.000*|
| 46 Being deceived                   | 1(0.4)         | 4(1.7)         | -          | 0.217*|
| All life events                     | 241(99.6)      | 214(88.4)      | 26.740     | <0.001|

# Fisher's Exact Test

Table 4 Comparing top 10 life events between female and male among the suicides

| Life events                                      | Total n (%) | Rank | Female n (%) | Rank | Male n (%) | Rank | \( \chi^2 \) |
|-------------------------------------------------|-------------|------|--------------|------|------------|------|-------------|
| 1 Being diagnosed with chronic diseases         | 191(78.9)   | 1    | 87(81.3)     | 1    | 104(77.0)  | 1    | 0.655       |
| 6 Hospitalization                                | 132(54.5)   | 2    | 48(44.9)     | 2    | 84(62.2)   | 2    | 7.257*      |
| 2 Being diagnosed with terminal illness          | 112(46.3)   | 3    | 40(37.4)     | 4    | 72(53.3)   | 3    | 6.108*      |
| 13 Death of a spouse                             | 77(31.8)    | 4    | 46(43.0)     | 3    | 31(23.0)   | 8    | 11.036*     |
| 8 Self-caring hard                               | 71(29.3)    | 5    | 26(24.3)     | 7    | 45(33.3)   | 5    | 2.350       |
| 24 Family poverty                                | 67(27.7)    | 6    | 21(19.6)     | 9    | 46(34.1)   | 4    | 6.223*      |
| 25 Living alone                                  | 65(26.9)    | 7    | 29(27.1)     | 5    | 36(26.7)   | 6    | 0.006       |
| 28 Children having left home                     | 65(26.9)    | 8    | 28(26.2)     | 6    | 37(26.4)   | 7    | 0.047       |
| 3 Life threatening illness to parents/spouse/children | 48(19.8)  | 9    | 23(21.5)     | 8    | 25(18.5)   | 10   | 0.333       |
| 7 Family members hospitalized                    | 44(18.2)    | 10   | 19(17.8)     | 10   | 25(18.5)   | 10   | 0.023       |

*: \( P<0.05 \)

Table 5 The risk factors of suicide among Chinese rural elderly
| Variables           | cOR (95% CI)         | P      | aOR (95% CI)         | P     |
|---------------------|----------------------|--------|----------------------|-------|
| Marital status      | 2.322 (1.599-3.374)  | <0.001 | 2.527 (1.479-4.317)  | 0.001 |
| Family annual income| 1.129 (0.899-1.418)  | 0.296  | -                    | -     |
| Living alone        | 2.126 (1.345-3.362)  | 0.001  | 1.258 (0.668-2.370)  | 0.478 |
| Physical disease    | 2.541 (1.650-3.912)  | <0.001 | 1.874 (1.092-3.218)  | 0.023 |
| Mental disorder     | 19.486 (10.350-36.687) | <0.001 | 20.311 (10.391-39.700) | <0.001 |
| Being left-behind   | 1.771 (1.039-3.017)  | 0.036  | 0.924 (0.466-1.832)  | 0.820 |
| Life events         | 31.533 (4.254-233.728)| 0.001  | 12.820 (1.578-104.175)| 0.017 |

cOR: crude odds ratio - Single factor analysis;

aOR: adjusted odds ratio - Multiple factors analysis