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The sociodemographic correlates of schizophrenia in Butajira, rural Ethiopia

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Abstract

Objectives: To describe the major sociodemographic correlates of schizophrenia, and their interactions, in a rural population of Ethiopia. *Methods*: We have recently completed a study in Butajira to identify cases of major mental disorders for description of course and outcome. A total of 318 cases of schizophrenia were identified by a door-to-door survey of a predominantly rural population of close to 68,500 individuals. Cases were confirmed by use of the SCAN and clinical assessment. *Findings*: The study showed that being male, under 35 years of age, unmarried, educated and living in an urban area were factors all associated with schizophrenia independently of each other. The risk of schizophrenia associated with being male was much higher in those aged 35 and over compared to those under 35 years of age. The risk of schizophrenia among males was higher in those not married (never married, separated, divorced or widowed) compared to those who were married. The association of marital status with schizophrenia was also more pronounced among those aged 35 year or over compared to those under 35. The association between schizophrenia and being unmarried was higher in urban than in rural areas. *Conclusion*: The sociodemographic correlates of schizophrenia in this rural population were similar to those described for the developed world. Furthermore, there were significant interactions between sex, age, marital status, area of residence and education as correlates of schizophrenia.

Keywords: Schizophrenia; Psychosis; Mental disorders; Ethiopia; CIDI

1. Introduction

Several studies have shown the association of sex, age, marital status, area of residence and socioeconomic status with the occurrence of schizophrenia in general populations. Thus, the risk of schizophrenia has been shown to be higher in males (Leung and Chue, 2000), in younger adults (Bromet et al., 1995), single or previously married individuals (Jablensky, 1995), residents of urban areas (Torrey et al., 1997) and in those with lower socioeconomic status (Dohrenwend et al., 1992). Most of these studies were conducted in the developed world. Thus, although these factors have been shown to be associated with schizophrenia in the developed world, it is unclear whether this also applies in rural areas of Africa. Previous studies from Ethiopia,

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which were based on small sample sizes, were not able to properly study these associations (Awas et al., 1999; Kebede and Alem, 1999).

In most major studies, when each of these sociodemographic correlates was evaluated, a statistical procedure has been used to adjust for the potential confounding effects of the other variables. Although each of these factors has been shown to be predictors of the occurrence of schizophrenia independently of each other, the interactions between these factors have not been well studied. Epidemiological studies should adjust for potential confounders in evaluating putative associations between two factors, and also, as much as possible, describe interactions between these factors (Rothman, 1986, p. 302). The term interaction is used in epidemiology to describe a situation in which two or more factors modify the effect of each other with regard to the occurrence or level of a given outcome. This phenomenon is also known as effect modification. Although on occasion the same variable may be both a confounder and an effect modifier, the two are different. Whereas confounding is undesirable, interaction is part of the web of causation, and may have important implications for prevention. Furthermore, it may not be appropriate to adjust for a factor if that factor is shown to be both a confounding variable and an effect modifier (Schlesselman, 1982, p. 171).

Because of the relatively large sample size needed to usefully describe interaction in population-based studies, and the relative rarity of schizophrenia, most epidemiological studies of schizophrenia have not been able to address this issue. We have recently completed a door-to-door survey of a predominantly rural population of almost 70,000 individuals to identify cases of major mental disorders and describe the course and outcome of these conditions. A total of 318 cases of schizophrenia were identified and were confirmed by use of the SCAN and clinical assessment. We used the baseline data collected from this study to describe the sociodemographic correlates of schizophrenia and their interactions in this population.

2. Methods

2.1. Setting

The study was conducted in the Butajira district 135 km south of Addis Ababa. The district has a population of 227,135, most of whom live in rural areas and are engaged in agriculture (OPHCC, 1996). The major ethnic group is Gurage, and the population is predominantly Muslim by religion.

2.2. Design

The design included a first-stage screening of the entire adult (15–49 years of age) population for schizophrenia, bipolar and depressive disorders using the relevant modules of the Amharic version of the Composite International Diagnostic Interview (CIDI) (Rashid et al., 1996; Wittchen et al., 1992; Robins et al., 1988). Since the CIDI has been shown to have limitation as a screening instrument for psychoses (Cooper et al., 1998; Andrews, 2000), and in an attempt to increase the CIDI sensitivity, we used the initial screening questions in the psychoses and affective disorders module of the CIDI to identify potential cases, instead of using the whole CIDI. Thus, individuals with a positive history of hallucinations, delusions, thought disorders or unusual behaviour were included as potential cases of schizophrenia for clinical confirmation. In addition, key informants were used to identify individuals with mental illnesses. Those selected as key informants were residents with intimate knowledge of their communities, and most were members of their respective subdistrict governing committees. From each subdistrict, four to six key informants were selected and trained before starting the survey. In the second stage, those cases that tested positive on the CIDI and those identified by key informants underwent evaluation by clinicians using the Amharic version of the Schedule for Clinical Assessment in Neuropsychiatry (SCAN) (Wing, 1996; Wing et al., 1989).

2.3. Inclusion and exclusion criteria

The study identified and evaluated individuals who met the following inclusion criteria: (a) age between 15 and 49 years; (b) residence for at least 6 months in the area; and (c) evidence of the presence of schizophrenia (ICD-10 designation: F20) after a comprehensive assessment using the SCAN. We deliberately selected the 15–49 age group as our study population to maximize the number of cases.

2.4. Data collection

Data collection started at the beginning of 1998 and was completed in mid-2001. This involved interviewing the entire district population 15–49 years of age (estimated at 100,000) except for one subdistrict (population: 17,000) that was not included because of physical inaccessibility. Psychiatric residents who had previously used the CIDI in other studies trained 15 male and 15 female high school students for 2 weeks. Key informants from the area were also trained to screen potential cases for further assessment. It was assumed that some cases that might be missed by the CIDI would be identified by the use of key informants. On the other hand, it was felt that the key informants should not be used as the sole method for identification of cases because cases so identified would be biased toward the more severe, obvious cases. Furthermore, the CIDI screening instrument could also identify subclinical cases. Therefore, both methods were used independently to compliment each other in the process of case finding. We have previously reported (Shibre et al., 2002) the results of a study (from Butajira) that compared the performance of CIDI and the key informant method in identifying cases with schizophrenia and affective disorders. When both screening methods were tested against the SCAN, the key informant method alone detected more cases of schizophrenia, whereas CIDI alone detected more cases of affective disorders. Key informants also performed better in detecting chronic cases.

SCAN interviews were undertaken on a full-time basis continuously until all eligible adults in the district had been screened. Because of the shortage of psychiatrists, residents in psychiatry working at Amanuel Psychiatric Hospital carried out the SCAN interviews after being trained for the SCAN, and under supervision of a consultant psychiatrist trained in the UK. Most of the potential cases identified by the CIDI and by key informants were visited at their homes by the clinicians to complete the SCAN interviews, but a few were interviewed at the Butajira Health Center.

2.5. Data processing

A full-time editor scrutinized all completed interview forms for completeness, accuracy and consistency. Data were then entered into computers using the Epi-Info (version 6) programme. CIDI and SCAN data entry programmes were used to enter data obtained by these two instruments. Double-entry

Table 1
Sociodemographic correlates of schizophrenia in Butajira, rural Ethiopia, 2002

Characteristics	Total population	Cases (%)	Crude odds ratio (95% confidence interval)	Adjusted odds ratio[a] (95% confidence interval)	*P*-value
Sex					
Female	39,243	53 (0.1)	1.00 (reference)	1.00 (reference)	
Male	29,248	265 (0.9)	6.76 (5.03, 9.08)	6.94 (4.98, 9.67)	<0.001
Age (years)					
15–24	28,325	76 (0.3)	1.00 (reference)	1.00 (reference)	
25–34	22,146	132 (0.6)	2.23 (1.68, 2.95)	2.46 (1.85, 3.27)	<0.001
35–49	18,020	110 (0.6)	2.28 (1.70, 3.06)	2.51 (1.87, 3.37)	<0.001
Area of residence					
Rural	61,082	254 (0.4)	1.00 (reference)	1.00 (reference)	
Urban	7409	64 (0.9)	2.09 (1.59, 2.74)	1.54 (1.16, 2.06)	0.003
Marital status					
Married	39,777	94 (0.2)	1.00 (reference)	1.00 (reference)	
Never married	25,102	163 (0.7)	2.84 (2.21, 3.66)	2.08 (1.61, 2.68)	<0.001
Separated/divorced/widowed	3612	56 (1.6)	6.65 (4.77, 9.27)	12.8 (9.04, 18.1)	<0.001
Education					
No formal education	48,939	170 (0.3)	1.00 (reference)	1.00 (reference)	
Formal education	19,552	148 (0.8)	2.19 (1.75, 2.73)	1.30 (1.02, 1.66)	0.03
Total	68,491	318 (0.5)			

[a] Terms included in the logistic model were sex, age (three levels), area of residence, marital status (three levels) and education.

schedule was employed for data entry in which data were entered twice by different clerks to ensure accuracy and consistency.

SPSS-PC was used for both univariate and bivariate analysis. The logistic regression method was employed to adjust for confounding. Schizophrenia was included in the logistic model as a dependent variable. As independent dichotomous variables, the following were included in the model: sex, age, marital status, area of residence and educational status. We constructed indicator variables to represent joint effects. The model was thus constructed with indicator terms for each category of joint exposure. The reference category was defined as those unexposed to two risk factors, thus necessitating three indicator terms: one for the presence of each exposure in the absence of the other and one for joint exposure (Rothman, 1986, p. 324). Variables were retained in the final model if the estimates were significant or if the addition of the term substantially changed the magnitude of the coefficients for the other terms (Tien and Eaton, 1992).

Consistent with advances in the conceptualization of interactions, we limited ourselves to the calculation of statistical additive interaction (Darroch, 1997). We used the definition of interaction based on the comparison between observed and expected joint effects of risk factor A (for example, age) and a third variable Z (for example, sex): interaction occurs when the observed joint effect of age and sex differs from that expected on the basis of the independent effect of the two variables (Szklo and Nieto, 2000, p. 220). Thus, we used the following formula to calculate the expected OR of both factors: Expected OR_{A+Z+} = Observed OR_{A+Z-} + Observed $OR_{A-Z+} - 1$.

The review committees of both the Department of Community Health and the Faculty of Medicine, Addis Ababa University, approved the study. All study subjects were interviewed after informed consent was obtained. Cases identified were offered psychiatric

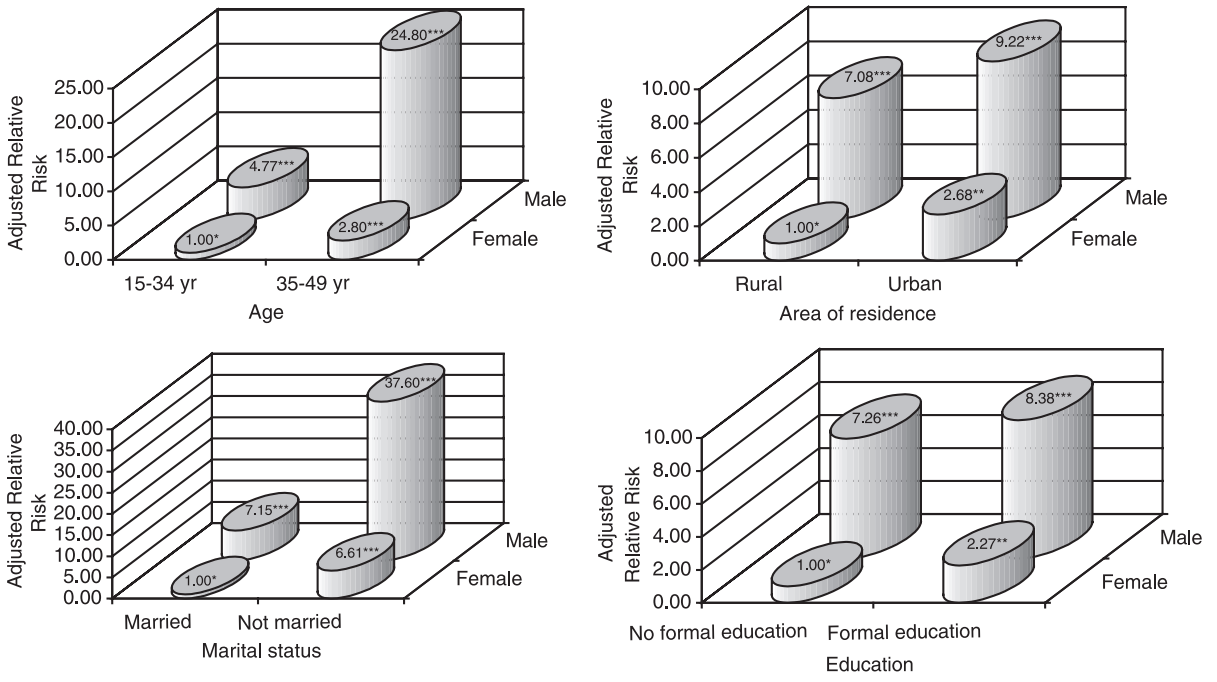

Fig. 1. Gender modifying the effect of age, area of residence, marital status and educational status on the occurrence of schizophrenia in Butajira, rural Ethiopia, 2002. Note: *reference category; **significant at $P<0.01$; ***significant at $P<0.001$. Terms included in the logistic model were sex, age (three levels), area of residence, marital status (three levels) and education. In addition, the relevant interaction term (age × sex), (marital status × sex), (area of residence × sex) or (educational status × sex) was included.

treatment free of charge, and this has continued after the study was completed.

3. Results

We screened the total population of the Butajira district, reaching 68,491 individuals with the CIDI and key informants. This accounted for 82% of the estimated 83,282 eligible population (ages 15–49 years) in the area. There were more females than males with a ratio of 1:1.3. Most of the study subjects were under 35 years of age (75%), rural dwellers (90%) and with no formal education (85%). A total of 2285 SCAN interviews were undertaken on potential cases identified both by the CIDI and/or the key informants. Of these, 318 were confirmed as cases of schizophrenia and were included in the analysis (Table 1).

Adjusted odds ratios (OR) and 95% confidence intervals (CI) show that males had a much higher risk of schizophrenia compared to females, OR (95% CI) = 6.94 (4.98, 9.67); and those aged 25 years or higher had twice the risk as those under 25. Urban dwellers had a 54% higher risk for the illness, OR (95% CI) = 1.54 (1.16, 2.06). Individuals who had never been married had three times the risk, and those previously married (separated, divorced or widowed) had six times the risk of having schizophrenia compared to those who were married. Those with formal education (i.e. those who attended school) had a 30% increased risk compared those with no education, OR (95% CI) = 1.30 (1.02, 1.66) (Table 1).

There was an interaction between age and sex. The risk of schizophrenia associated with being a male was much higher in those aged 35 and over compared to those below 35 years of age. The observed joint effect of age and sex (adjusted OR) was 24.8 and was

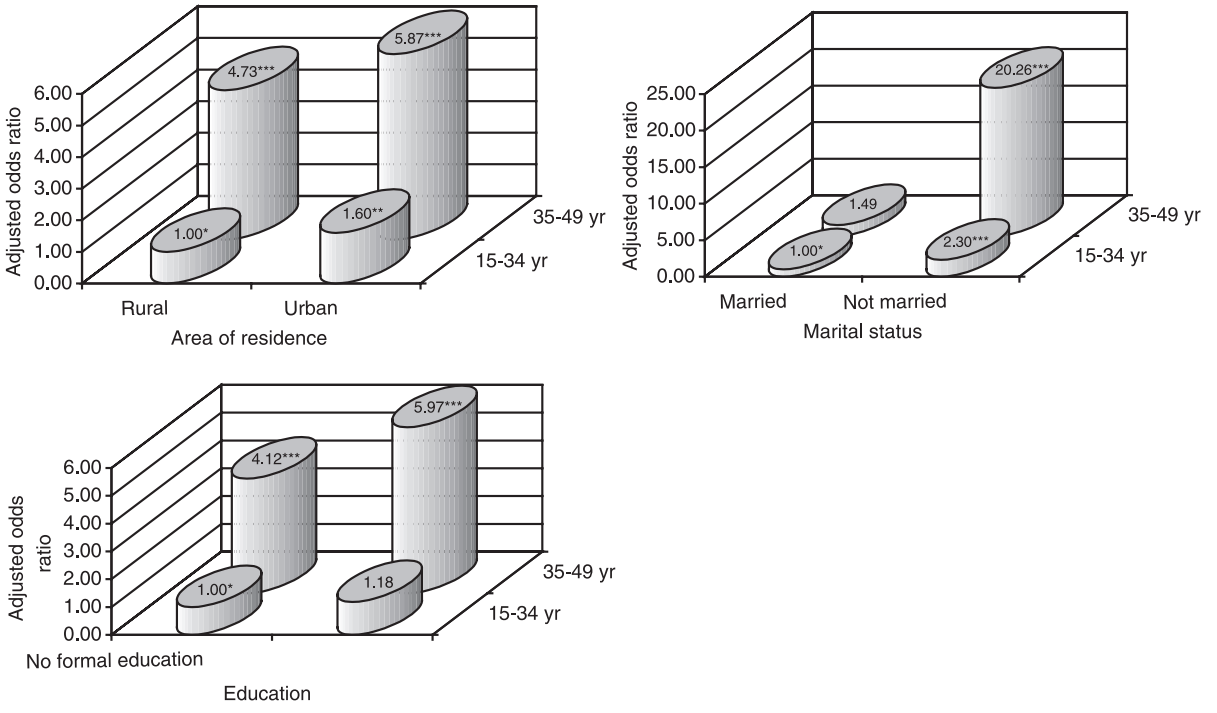

Fig. 2. Age modifying the effect of area of residence, marital status and education on the occurrence of schizophrenia in Butajira, rural Ethiopia, 2002. Note: *reference category; **significant at $P < 0.01$; ***significant at $P < 0.001$. Terms included in the logistic model were sex, age (three levels), area of residence, marital status (three levels) and education. In addition, the relevant interaction term (residence × age), (marital status × age) or (educational status × age) was included.

much higher than that of the expected (expected $OR_{A+Z+}=6.7$). There was also a strong interaction between marital status and sex. The risk of schizophrenia associated with not being married (never married, separated, divorced or widowed) was much higher in males than in females. The observed joint OR (37.6) was higher than the expected joint OR from the additive model (12.8). The association between area of residence and education on the one hand and schizophrenia on the other was not modified by sex (Fig. 1).

Age strongly modified the association of marital status with schizophrenia. The association of marital status with schizophrenia was more pronounced among those aged 35 years or over compared to those under 35. The expected OR, which was 2.8, was much lower than that of the observed joint OR (20.3). The association between area of residence and education on the one hand and schizophrenia on the other was not modified by age (Fig. 2).

The risk of schizophrenia among those unmarried was modified by residence, being higher in urban than in rural areas. The observed joint OR, which was 8.43, was higher than the expected joint OR of 5.26. There was only a weak additive interaction between area of residence and educational status (Fig. 3).

4. Discussion

Our findings show that sex, age, marital status, urban/rural residence and education were significantly associated with schizophrenia independently of each other. These findings are consistent with earlier reports from Ethiopia (Awas et al., 1999; Kebede and Alem, 1999) and elsewhere (Bromet et al., 1995). There were interactions between age and sex; age and marital status; marital status and area of residence; marital status and sex; and area of residence and education.

There could be a number of reasons for observing interaction between two variables. The apparent interaction may be due to chance, selective confounding or bias. These need to be accounted for before the

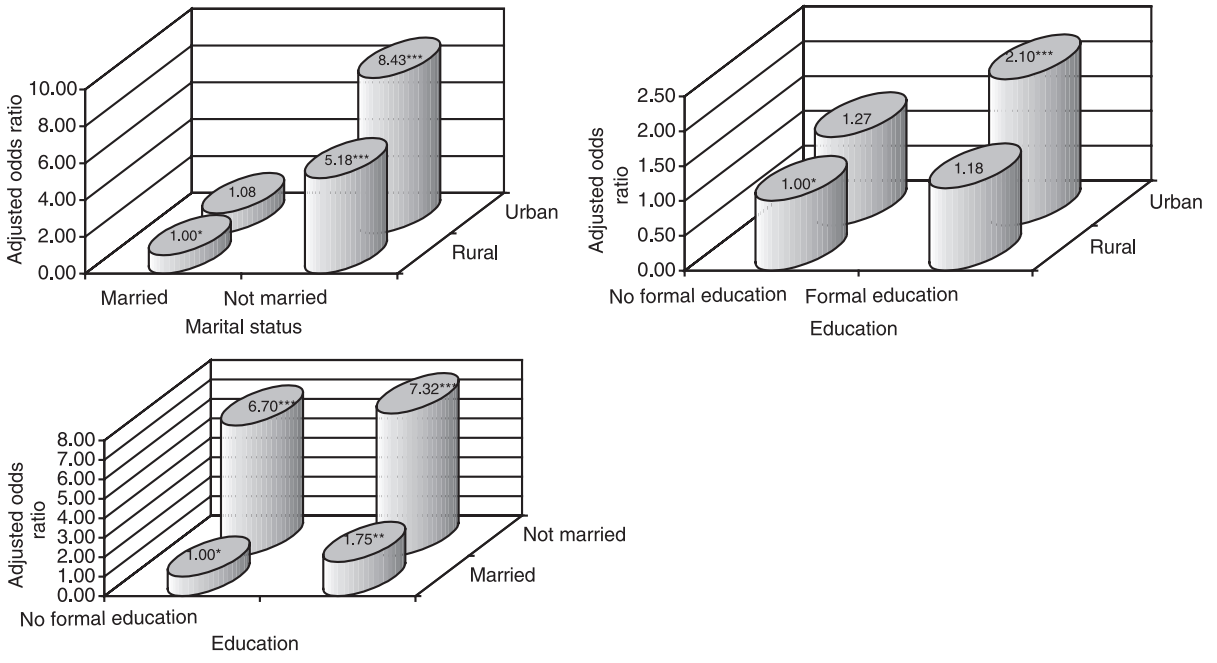

Fig. 3. The effect of interaction of area of residence, marital status and educational status on the occurrence of schizophrenia in Butajira, rural Ethiopia, 2002 Note: *reference category; **significant at $P<0.01$; ***significant at $P<0.001$. Terms included in the logistic model were sex, age (three levels), area of residence, marital status (three levels) and education. In addition, the relevant interaction term (marital status × residence), (educational status × residence) or (educational status × marital status) was included.

observed interaction is deemed to be significant. Our results are based on a relatively large population and thus the role of chance is low. In evaluating the presence of interactions, we used adjusted odds ratio estimates instead of crude ORs; thus, confounding is an unlikely explanation for our observation. Our coverage of almost the entire adult population (15–49 years) of the district, and use of structured data collection instruments, minimized the possibility of selection or information bias. On the other hand, we used prevalence estimates instead of incidence, based on recent-onset cases. If mortality from schizophrenia is different between the sexes, this differential mortality could lead to the interaction of age and sex. The same may also be true if there is a differential recovery rate from schizophrenia. Another possible source of error is misclassification of age in this predominantly rural and illiterate population. In some cases, we used major historical events to estimate the age of participants. Although misclassification of age is possible, it is likely to be minimal because we used age grouping in two major categories, thus decreasing the likelihood of misclassification between the categories.

Our finding that the risk of schizophrenia associated with being male was much higher in those aged 35 and over compared to those under 35 years of age is not consistent with most studies reported in the literature. These studies have shown that a male excess of schizophrenia is greater in the younger age groups due to men having an earlier age of onset than women (Leung and Chue, 2000). Unlike the reports of many earlier studies, the mean age of onset of the psychotic symptoms was higher for males than for females in our study (Alem et al., in press). It is possible that female participants of the study underreported their age, although this would be difficult to verify. If indeed females do have an earlier onset of symptoms in Butajira, this might be due to the stress women are exposed to. Thus, females experience more stress than males such as early and family-arranged marriage, and other factors such as repeated abortions, pregnancy and child birth, etc., which are not experienced by males, and these might trigger the relatively earlier onset. Studies from the same district have also indicated that stressful life event scores were significantly higher for females compared to the males (Deyassa et al., 2001). There are similar reports from some other cultures in which females develop the symptoms of schizophrenia at a younger age than males (Murthy et al., 1998).

We have also shown that the association of schizophrenia with being unmarried was higher among males compared to females. The association between marital status and schizophrenia can be explained by avoidance of a relationship, or the inability to start or sustain a long-term relationship (Bromet et al., 1995). There could be other reasons for the interaction of marital status and sex. One possible reason could be that marriage is more often arranged for females compared to males who are more often expected to arrange it on their own. Thus, the chance of marriage for females is higher than that for males regardless of their mental status. Similarly, arranged marriages are also more common in rural settings compared to urban areas and at younger ages. These factors again may account for the observed higher risk of schizophrenia in unmarried individuals among males, in older age groups and in urban areas, and thus for the interaction. Another reason could be that the clinical course of the disorder is milder in women compared to men (Leung and Chue, 2000). As a result of higher social function, women may better establish and sustain relationships. As we are currently following this cohort of cases, we may be able to address this issue in the future.

Education, occupation and income levels are all measures of socioeconomic status, which is known to be associated with schizophrenia (Dohrenwend et al., 1992). In this predominantly rural and agricultural society, data on occupation and income levels are either not very informative (e.g. almost all individuals work in agriculture or in the house as homemakers) or is difficult to measure (e.g. money is not always used for transactions). We have thus taken education as a proxy measure of social class. Unlike previous reports from the literature (Bromet et al., 1995), however, risk of schizophrenia was higher among those with some formal education, compared to those without any formal education. This association was independent of other factors as shown by the adjusted odds ratio estimates. This association was also not modified by sex, age, marital status or area of residence. The range of educational levels reported in our study (most participants were either not literate or have attained only elementary education) is substantially different from that reported in the literature particularly those

reports from the developed world. This makes comparisons with those studies problematic. It is also possible that selection processes could explain this finding. If mortality associated with schizophrenia is higher among the uneducated, studies based on prevalence data (such as the prevalent ones) could show association between education and schizophrenia because of a survivorship bias (which is a form of selection bias). Sample size limitation did not allow us to use incident cases instead of prevalent cases.

Fitting further interactions beyond the known ones is only possible if the known interactions are already in the model. In other words, the basic model should at least include the age/sex, the age/marital status and the sex/marital status interactions before introducing age/residence, age/education, sex/residence, etc., interactions. We were not able to do this in a logistic regression because of the relatively limited number of our cases and the strength of the age, sex and marital status. This is one limitation of the study. On the other hand, the degree of interactions involving variables other than the above three was not substantial. We suspect that there would not be interaction if the basic model included the age/sex, age/marital status and sex/marital status interactions before introducing new ones.

In conclusion, the present study shows that being male, over 25 years of age, unmarried, educated and living in an urban area are associated with schizophrenia independently of each other. Furthermore, there were significant interactions between sex, age, marital status, area of residence and education as correlates of schizophrenia. This indicates that adjustment for these factors in a logistic model may not be appropriate. Instead, researchers should try to describe these interactions. Future studies with larger sample sizes and incident cases could shed more light into the reasons for these interactions.

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