Treated incidence of first episode psychosis in Sinop, Turkey: results of a 4-year admission-based study – SINOPsy

Tolga Binbay[1] , Özden Merve Mollaahmetoğlu[2] , Umut Kırlı[3] , Deniz Arık[4] and Köksal Alptekin[1,5]

[1]Faculty of Medicine Department of Psychiatry, Dokuz Eylül University, Izmir, Turkey; [2]Department of Psychology, University of Sheffield, Sheffield, United Kingdom; [3]Institute on Drug Abuse, Toxicology and Pharmaceutical Science, Ege University, Izmir, Turkey; [4]Izmir, Turkey and [5]Department of Neuroscience, Graduate School of Health Sciences, Dokuz Eylül University, Izmir, Turkey

Abstract

Background. The incidence of psychotic disorders varies in different geographic areas. As there has been no report from Turkey, this study aimed to provide the treated incidence rate of first-episode psychosis (FEP) in a defined area.

Methods. All individuals, aged 15–64 years, presenting with FEP (ICD-10 F20-29, F30-33) to mental health services in a defined catchment-area in Sinop which is located in the Black Sea region of the northern Turkey were recorded over a 4-year period (2009 to 2012). Incidence rates of psychotic disorders and their 95% confidence intervals (CIs) were estimated. Poisson regression was applied to estimate the differences in incidence rate ratio (IRR) by age, sex, and urbanicity.

Results. One hundred and fifteen FEP participants were identified during the 4 years. Crude incidence rates of all psychoses, schizophrenia, other psychotic disorders, and affective psychotic disorders were respectively 38.5 (95% CI 27.1–49.9), 10.7 (95% CI 6.6–14.8), 10.0 (95% CI 5.7–14.3) and 17.7 (95% CI 11.3–24.2) per 100 000 person-years. After age-sex standardisation the rates increased slightly. There were no gender differences in the incidence rates. IRR of any psychotic disorder was highest in the youngest age group (15–24 years) compared to the oldest age group (55–64 years), 7.9 (95% CI 2.8–30.5). In contrast with previous studies, the incidence rate of any psychotic disorder was not significantly increased in urban areas compared with rural areas.

Conclusions. The current study, the first of its kind from Turkey, indicates that the risk of schizophrenia and other psychotic disorders in a lowly urbanised area of Turkey is comparable to those reported in Western European cities.

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Introduction

Three decades ago, the World Health Organization's (WHO) 10 Nation Study examined cross-cultural variation in the incidence and the course of psychotic disorders (Jablensky et al., 1992). Despite two-to-threefold variation in incidence rates across study centres, the results have long been interpreted as evidence that psychotic disorders are similarly prevalent in different parts of the world (McGrath, 2005). This interpretation has subsequently been challenged by systematic reviews, meta-analyses, and new multisite studies (Bastien et al., 2023; Jongsma et al., 2018; McGrath et al., 2004). The variations in incidence may provide clues to the aetiology of psychotic disorders, particularly the types of environments that increase or differentiate the risk for the disorder. In the meta-analysis of rates from low- and middle-income countries, estimates were based on very limited settings, highlighting the need for new studies in non-Western countries (Bastien et al., 2023).

Distribution of non-affective psychosis in Western countries is closely linked to the degree of urbanisation, with higher rates concentrated in inner-city areas (Jongsma, Turner, Kirkbride, & Jones, 2019, 2021; March et al., 2008), an effect that may be amplified by socio-economic deprivation, inequality and social capital (Allardyce & Boydell, 2006; Drukker, Krabbendam, Driessen, & van Os, 2006; Hogerzeil, van Hemert, Veling, & Hoek, 2017; Kirkbride et al., 2008; March et al., 2008; Sariaslan et al., 2015; Veling et al., 2008). Most of the current literature on the incidence of psychotic disorders comes from studies conducted in North America and Europe (Jongsma et al., 2019; Plana-Ripoll, Pedersen, & McGrath, 2018); there are limited reports of the rates of psychotic disorders among people living in urban and rural settings in other countries.

While social and economic aspects of the environment play an important role in the onset of psychosis (Van Os, Kenis, & Rutten, 2010), the incidence of psychotic disorders varies

substantially by urbanicity (Vassos, Pedersen, Murray, Collier, & Lewis, 2012), migration status (Selten, Van Der Ven, & Termorshuizen, 2020) and ethnicity (Brandt et al., 2019). First-, second-, and even third-generation migrants have an increased risk of non-affective psychotic disorders compared to the native population (Selten et al., 2020). Migrants from Turkey are among the largest non-Western migrant populations in Europe, particularly in Germany, the Netherlands, Belgium, and France (Şen, 1996). Incidence rates of schizophrenia and other psychoses are elevated among second and third generation migrants from Turkey compared to the native population in the Netherlands, though this effect is not seen among first-generation migrants (Binbay, Ulaş, Alptekin, & Elbi, 2012; Hogerzeil et al., 2017; Selten, Laan, Kupka, Smeets, & Van Os, 2012, 2020; Veling et al., 2007; 2008).

So far, there has been no report on the incidence of psychosis in Turkey. Furthermore, the incidence in Turkey could provide additional epidemiological insights, as the political and socio-economic landscape of Turkey differs significantly from that of European and North American countries. Turkey has undergone an important social and economic change over the past three decades. The total population has grown beyond the average of most European countries and there has been a huge internal migration which has resulted in the rural population shrinking to 15% of the population. It is worth noting that the direction of development was not the same for all cities: in big cities (e.g. Istanbul, Ankara, Izmir) population doubled, but some cities that were economically disadvantaged lost significant proportion of their population.

The present article reports data from the *Incidence and Prevalence of Psychotic Disorders in Sinop, Turkey* (SINOPsy) study, which was conducted to provide treated prevalence and incidence of psychotic disorders in a defined area using all eligible health registries (Binbay, Arık Binbay, Ulaş, & Alptekin, 2016). The aims of the SINOPsy were (i) to estimate the treated incidence of first episode psychotic disorders in a defined area, based on health-registries, over a 4-year period, (ii) to investigate whether or not the onset of psychotic disorders (particularly schizophrenia) is associated with the level of urbanisation (urban, semi-urban or rural) in a non-Western, unique setting, and (iii) to provide internationally comparable incidence rates. Although the treated incidence rate partially reflects the actual burden of the disease in the population, this is the first report on the incidence of psychotic disorders in Turkey, with a study design similar to international studies.

Methods

The SINOPsy study is a register-based study of psychotic disorders, conducted from 2009 to 2012 in four districts of Sinop, a province in northern Turkey, located on the Black Sea coastline, to estimate the register-based prevalence and the treated incidence of schizophrenia, schizophrenia spectrum disorders and mood disorders with psychotic features. While Community Mental Health Centres have been implemented in Turkey since 2007 to provide social rehabilitation services to individuals with schizophrenia and related disorders (Gökalp & Aküzüm, 2007), there were none in Sinop during the study period. Therefore, three health registers were used to identify probable cases of first-episode psychotic disorders (ICD-10 [International Classification of Diseases] codes: F10-F29 and F30-F33) presenting to any primary and secondary health care services in the catchment area: (i) computerised case records from the Sinop Atatürk State Hospital, (ii) computerised

case records from the local health directorate, and (iii) case lists from the family doctors. A list of probable cases was obtained by pooling cases from these three sources (Supplementary Fig.) (Binbay et al., 2016).

Ethical approval for data extraction was obtained from the local health directorate (date 22.07.2011 and issue number 12906) under the terms of the regulations of the Ministry of Health (the Regulation on Clinical Trials, approved on 19.08.2011). In addition, regulations on Scientific Research and Publishing Ethics issued by the Council of Higher Education (date 29.08.2012 with a number of 2012.18.946) were considered during data collection. At each stage of data collection, the ethical principles outlined in the Declaration of Helsinki were followed.

The setting

Sinop is a province on the northern coast of Turkey (Fig. 1). High mountains that stretch along the Black Sea surround the west and south of the province and cut the province off from the rest of the Anatolian plateau, thus limiting social, economic and logistical opportunities. In 2012, Sinop had a population of 201 311, (TürkStat, 2013) of which 55.7% lived in urban settings, whereas 77.2% of Turkey's population resided in urban areas in the same year (TürkStat, 2013). In recent decades, more than half of the population of the Black Sea region, where Sinop is located, has migrated to larger cities, including Istanbul. Consequently, the total population of Sinop decreased from 300 000 inhabitants in 1990 to 200 000 in the 2010s, mainly due to migration from the rural parts of the province and mainly to Istanbul (Erkan Buğday & Özden, 2017).

The province consists of nine districts including Sinop as the centre of the province. The study area included four districts (*Sinop, Ayancık, Erfelek* and *Gerze*) closest to the single secondary health care provider (Sinop Atatürk State Hospital) with outpatient, inpatient and forensic units for mental health (see Fig. 1). The remaining five districts were further away from the Atatürk State Hospital and had access to other secondary and tertiary health services in neighbouring provinces. To maximise the quality and coverage of the health registers, these five districts were excluded.

Population at risk

The catchment area of SINOPsy covered 55.8% of the population of Sinop province (43 798 rural and 68 605 urban) in 2012. The denominators for the at-risk population, 15 to 64 years olds, were derived for each year based on the online system of Turkish Statistics Institute, and ranged from 73 203 in 2009, 73 893 in 2010, 75 078 in 2011, and to 76 351 in 2012 (TurkStat, 2013). The total at-risk population was estimated by adding up these four sub-populations, resulting in a total number of 298 525 person-years. The at-risk population was stratified by gender, age (5-year age bands), marital status (ever married, single, and divorced) and urbanicity level (rural, semi-urban, urban – defined by population size: rural has less than 1000 inhabitants; semi-urban has 1000 to 15 000 inhabitants; and urban has 15 000 to 35 000 inhabitants).

Case record registries

Three registries were used to pool probable cases of psychotic disorders covering any primary and secondary health care services in the catchment area: (i) computerised patient records of the Sinop
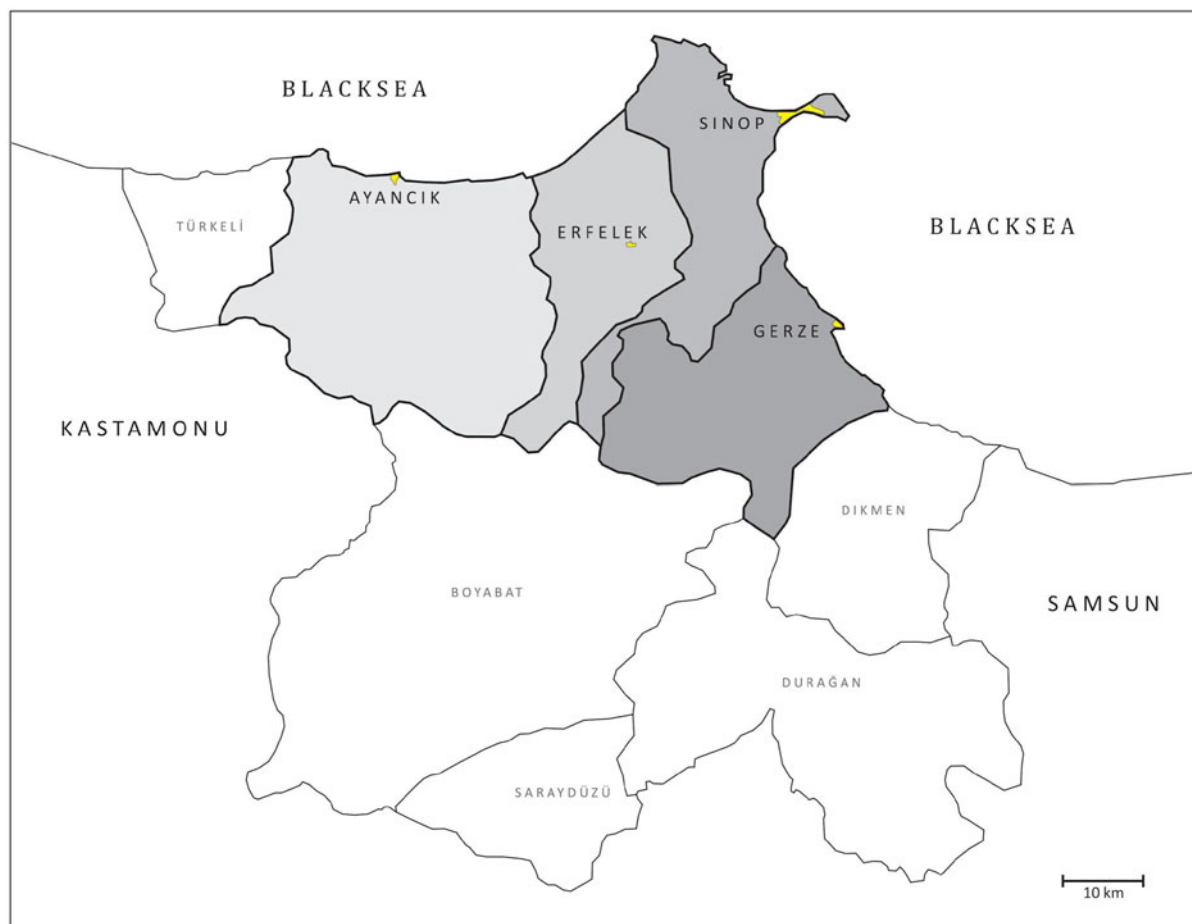
Figure 1. Defined area of the SinoPsy study.

Atatürk State Hospital, (ii) computerised case records of the local health directorate, and (iii) case lists from the family medicine units in the study area (Binbay et al., 2016).

Case registry of the secondary health service

State Hospital was the single health care provider in the defined catchment area which provides emergency, outpatient, inpatient, and forensic mental health care services. The hospital was the only health facility for other health problems including neurology, internal medicine, forensic medicine, and medical board of disability. Additionally, referrals to tertiary mental health services in other provinces for emergency and forensic medical dispatch were being processed through the Atatürk State Hospital. Any admission to the hospital was recorded with an ICD-10 diagnosis (World Health Organization, 1993). Between the 1 January 2009 and the 31 December 2012, any admission to the hospital including inpatient, outpatient, emergency, medical evaluation board and forensic board units with ICD-10 diagnoses of F20-29, F30-31, F32.3, F33.3 was included in the dataset as a probable case of psychotic disorder. Any psychotic disorder with a diagnosis of F06.2, F10.5, F12.5, F19.5, F-38-39, or F53.1 was also evaluated and excluded after diagnostic ascertainment.

Local health directorate

The Ministry of Health in Turkey maintains a case registry system for the patients with severe mental illnesses. These records are kept by the local health directorate and classified under four different forms: RS10, RS20, RS30, RS40 (the initials correspond to mental health [*ruh sağlığı*] in Turkish). The RS10 is used by the local health directorate to refer a patient to a regional mental health hospital. At the time of discharge from regional hospital, RS20 form is filled to inform the local health directorate about the patient's current mental state and needs to ensure that they are followed-up appropriately within their local area. Each year, the local health directorate uses the RS40 form to report the total number and the ICD-10 diagnoses of patients recorded under RS10 and RS20 forms to the ministry of health.

All cases under RS10, RS20, and RS40 registry system of Sinop's local health directorate between the 1st of January 2009 and 31st of December 2012 were included in the probable case pool, regardless of their diagnoses.

Case lists of the family medicine

During the study period, there were 29 family medicine units within the catchment area. Using an electronic database, family doctors record at least one ICD-10 diagnostic code for each patient that they follow-up or prescribe to. The local health directorate requested from all family medicine units the case records of any patients in the defined area with a diagnosis of any psychotic disorder (ICD-10 codes: F20-29, F30-31, F32.3, F33.3) during the study period. 22 units agreed with the request and provided the full list of patients, which were then added to the probable case pool.

Inclusion and exclusion criteria

The probable cases from the three sources were pooled (by TB), and patients with multiple records were counted only once (for details Supplementary Figure) (Binbay et al., 2016). The list of probable cases (n: 1410) contained information about the patients' names and surnames, identity numbers and ICD-10 codes. All ICD-10 codes were included for patients with multiple diagnoses. Probable cases who were, by the 1 January 2011, (i) younger 15 and older than 64 years old, (ii) resident outside of the catchment area, (iii) institutionalised (orphanage, nursing home, prison and those undertaking military service), (iv) those who had learning disabilities (intellectual disability), and (v) unclear diagnoses were excluded from the study population.

Case ascertainment and final diagnoses

Patients aged 15 to 64 years presenting for the first time to primary and secondary mental health services with a first episode of psychotic disorders (ICD-10 codes F10-29 and F30-33) were identified for a 4-year period (January 2009–December 2012). The case ascertainment (by TB and DAB) was undertaken between 1 June 2010 to 31 December 2012 using the following methods: Structured Clinical Diagnostic Interview for DSM-IV Axis I Disorders (SCDI-I) (First, Spitzer, Gibbon, & Williams, 2001), structured interview via the telephone, and best-estimate diagnosis based on case records. Initially, clinical interviews were completed during the hospital admission for probable cases identified through the Atatürk State Hospital registry. Clinical interviews were corroborated by additional interviews with at least a relative and/or spouse when necessary. If a clinical interview had not been conducted at the time of admission to hospital, probable cases were contacted by telephone and invited to hospital for a clinical interview. In cases where a clinical interview was not possible, a structured interview which collected information on the psychosis scale of SCID-I, any inpatient admission and most recent medication was conducted via the telephone (by TA and DAB). Moreover, an interview with at least a relative and/or a spouse was carried out in addition to the phone interview with probable cases. If a clinical interview neither at the hospital nor via the telephone was possible, expert clinicians (TB, DAB, KA) made a best-estimate diagnosis based on diagnostic information present in the medical records. A 6-month of leakage period followed the main study to identify subjects missed by the main process.

All final diagnoses were converted from DSM-IV into ICD-10 categories to provide international comparability and compatibility with recent studies (Jongsma et al., 2018; Tarricone et al., 2012).

Statistical analysis

Statistical analyses were carried out using SPSS Version 24.0. Overall and gender, age, marital status, and urbanicity specific incidence rates per 100 000 person-years for all psychoses (F20-29; F30-31; F32.3; F33.3), schizophrenia (F20), non-affective psychoses (F20-29) and affective psychoses (F30-31; F32.3; F33.3) were calculated with their 95% confidence intervals (CIs) for the total population. Following the crude incidence rates, we calculated age-band and sex standardised incidence rates using direct standardisation. First, guided by previous literature (Jongsma et al., 2018), we used the total population of England and Wales (2011 Census) (Office for National Statistics, 2013) as our standard population. Then, we used the world population prospects (year 2011) (United Nations, Department of Economic and Social Affairs, Population Division, 2022) as our standard population to estimate age-band and sex standardised incidence rates. All crude and standardised incidence rates were presented with their 95% CIs incidence rate ratios (IRR) with 95% CI were calculated using Poisson regression for age, sex, and urbanicity. IRRs for urbanicity (reference rural) were adjusted for age and sex.

Results

Patient characteristics

A total of 115 individuals were identified presenting with a first-episode psychotic disorder, as defined by the ICD-10 criteria, during the 298 609 person-years, corresponding to a crude incidence of 38.5 (95% CI 27.1–49.9) per 100 000 person-years. The crude incidence rates of schizophrenia, other non-affective psychoses and affective psychoses were respectively 10.7 (95% CI 6.6–14.8), 10.0 (95% CI 5.7–14.3), and 17.7 (95% CI 11.3–24.2) per 100 000 person-years (Table 1). Age and sex standardised (to the total population of England and Wales, and World population in 2011) incidence rates of any psychotic disorder were 38.2 (95% CI 31.5–45.9) and 42.4 (95% CI 34.9–50.9) per 100 000 person-years, respectively. Age and sex standardised incidence rates of schizophrenia were 10.5 (95% CI 7.2–14.8) and 11.7 (95% CI 8.0–16.6) per 100 000 person-years, respectively. Age and sex standardised incidence rates of other non-affective psychoses were 10.2 (95% CI 6.9–14.6) and 10.9 (95% CI 7.3–15.5) per 100 000 person-years, respectively. Age and sex standardised incidence rates of affective psychoses were 17.5 (95% CI 13.1–23.0) and 19.8 (95% CI 14.8–25.8) per 100 000 person-years, respectively.

The majority of patients were women (n = 63, 54.8%). The mean age at onset was 30.8 (S.D.: 11.2) and at first contact was 31.3 [Standard deviation (S.D.): 11.7] (Table 2). The first contact was earlier in men (mean = 29.6, S.D.: 9.7 years) than in women (mean = 32.7, S.D. = 13.0 years) and did not differ by urbanicity (F = 0.78; p = 0.45). 65.3% of men and 63.5% of women in the sample had a first contact with mental health services before 35 years of age. The majority of cases were single (n = 49, 42.6%), had lower level of education (n = 46, 40% none or primary school), and were economically inactive (n = 61, 53% student, housewife or disabled), and were resident in urban and/or semi-urban areas (n = 78, 67.8%). The main sociodemographic characteristics of the patients are displayed in Table 2.

Diagnoses

27.8% (n = 32) of the participants with first-episode psychosis (FEP) were diagnosed with schizophrenia, and 26.1% (n = 30) with other non-affective psychoses, 40% of which (n = 12) had a diagnosis of acute and transient psychotic disorder (Table 2). Affective psychoses compromised 46.1% (n = 53) of cases, of whom 64.1% (n = 34) had bipolar disorder and 35.9% (n = 19) depression with psychotic features.

Pathways to care

The primary route of admission was the outpatient psychiatry unit of State Hospital, with 70.4% (n = 81) of cases being

Table 1. Crude incidence rates of all FEPs, schizophrenia, nonaffective psychoses and affective psychoses in the catchment area

	Mid-period denominator population	Any psychotic disorder		Schizophrenia		Other psychotic disorders		Affective psychoses	
		Cases	Incidence[a]	Cases	Incidence[a]	Cases	Incidence[a]	Cases	Incidence[a]
Defined area	73 893	115	38.5 (27.1–49.9)	32	10.7 (6.6–14.8)	30	10.0 (5.7–14.3)	53	17.7 (11.3–24.2)
Sinop	39 018	65	41.2 (36.5–93.4)	13	8.2 (2.8–13.7)	23	14.7 (9.3–22.1)	29	18.4 (8.7–28.1)
Ayancik	14 637	24	40.6 (21.1–60.0)	8	13.5 (3.3–23.7)	5	8.4 (1.1–15.8)	11	18.6 (5.4–31.8)
Erfelek	6930	7	25.0 (4.4–45.6)	1	3.5 (−3.5–10.7)	1	3.5 (−3.5–10.7)	5	17.9 (2.4–33.3)
Gerze	13 308	19	35.3 (16.6–54.1)	10	18.6 (7.7–29.4)	1	1.8 (−1.8–5.6)	8	14.9 (1.4–28.4)

[a]Given per 100 000 person-years with 95% CIs.

identified through this pathway. This route was followed by admissions to other health services including primary care, neurology, internal medicine, and mental health services in one of the neighbouring provinces, and informal pathways (self-referral, family, or friends) (Table 2).

Differences in incidence estimates

Due to the small number of cases, it is difficult to make confident inferences regarding patterns of incidence by age and gender. There was no evidence of gender differences in the incidence rates (Tables 3 and 4). Incidence of any psychotic disorders and schizophrenia were highest among the youngest age group (15–24) compared to the oldest age group (55–64) with respective IRRs of 7.9 (95% CI 2.8–30.5) and 4.1 (95% CI 1.1–21.9). In contrast, individuals aged between 25 and 34 had respectively 9.7 (95% CI 1.3–42.0) and 2.6 (95% CI 1.0–8.2) times greater likelihood of having an onset of other non-affective psychoses and affective psychoses than the oldest age group.

The data suggests that the age pattern of incidence rates for any psychotic disorder differs between men and women (Fig. 2 and Table 3). However, rates should be regarded with caution since there were very small number of cases in some of the age groups as evidenced by the large CIs. Crude incidence rates of any psychotic disorder peaked for men between the ages of 15–24 (60.0 per 100 000 person-years; 95% CI −0.4 to 114.3) and decreased sharply after the age of 44. For women, the incidence of any psychotic disorder peaked between the ages of 25–34 (67.0 per 100 000 person-years; 95% CI 12.5–121.6) and decreased gradually thereafter with a small secondary peak between the ages of 45 and 54.

Incidence rates did not appear to be significantly raised in urban areas compared to semi-urban and rural locations, although there was a trend for higher incidence of any psychotic disorders in urban settings (IRR = 1.4 95% CI 0.9–2.3) (Table 3). However, the main difference in urbanicity risk was not associated with schizophrenia; the risk was associated with other psychotic disorders, and affective psychoses (respectively IRR = 1.7; 95% CI 0.4–8.5 and 1.6; 95% CI 0.6–4.5) with relatively large CIs pointing to small number of cases.

Discussion

We conducted a register-based study between 2009 and 2012 to estimate the treated incidence of ICD-10 psychotic disorders including schizophrenia, schizoaffective disorder and bipolar I disorder in Sinop. This is the first study reporting incidence rates of psychotic disorders in a defined catchment area in Turkey.

The crude incidence rates of psychotic disorders in Sinop were comparable to findings from the wider literature of psychiatric epidemiology in European and North American countries using similar methodologies (Jongsma et al., 2018; McGrath et al., 2004). On the other hand, incidence rates reported in Sinop were over two-fold of those reported in Italy, Spain, and Brazil (Del-Ben et al., 2019; Jongsma et al., 2018; Lasalvia et al., 2014; Mulè et al., 2017; Tarricone et al., 2012), but lower than the rates in the Aetiology & Ethnicity in Schizophrenia and Other Psychoses (AESOP) study which was conducted in London (Kirkbride et al., 2006). Higher incidence rates reported in AESOP were attributed to high levels of immigration (Morgan et al., 2017) which is strongly associated with higher risk of psychosis (Morgan, Charalambides, Hutchinson, & Murray, 2010). However, almost all of the ethnic make-up of the SINOPsy region

Table 2. Denominator population and sociodemographic characteristics of the FEP cases in the SINOPsy catchment area (2009–2012)

	n	%
Mid-period denominator[2010]		
Total	73 893	100.0
Sex		
Female	36 895	49.9
Male	36 998	50.1
Place of residency		
Rural	27 736	37.5
Semi-urban	18 756	25.4
Urban	27 401	37.1
FEP cases		
Total	115	100.0
Sex		
Female	63	54.8
Male	52	45.2
Age[a]		
15–24	39	33.9
25–34	35	30.4
35–44	23	20.0
45–54	14	12.2
55–64	4	3.5
Education[b]		
None	8	7.0
Primary school	38	33.0
Secondary school	28	24.3
High school	20	17.4
University	10	8.7
Marital status[c]		
Single	49	42.6
Married	48	41.7
Divorced	8	7.0
Social Insurance[d]		
None	7	6.1
Yeşil Kart	22	19.1
SSK/Bağkur	58	50.5
Emekli Sandığı	17	14.8
Employment[e]		
Unemployed	4	4.5
Disabled	9	7.8
Housewife	38	33.0
Student	14	12.2
Employed/retired	37	32.2
Place of residency		
Rural	37	32.2

(Continued)

Table 2. (Continued.)

	n	%
Semi-urban	25	21.7
Urban	53	46.1
Pathways to care		
Outpatient unit	81	70.4
Emergency service	13	11.3
Forensic admission	3	2.6
Other health services	18	15.7
Diagnoses		
Schizophrenia (F20)	32	27.8
Non-affective Psychoses (F21-29)	30	26.1
Affective Psychoses (F30-33)	53	46.1
	Years	Standard deviation
Mean age at onset[f]	30.8	11.2
Mean age at first contact	31.3	11.7

[a]refer to year 2010.
[b]11 missing.
[c]10 missing.
[d]11 missing.
[e]13 missing.
[f]2 missing.

consists of Turks, intra-country migration might explain relative high incidence rates of psychotic disorders in a low urbanised area with an opposite direction: Migration might have led to residue of the genetically and/or socially high-risk group in the region (Tarricone et al., 2016). We used two populations for standardisation: total population of England and Wales, and total population of World. The age and sex distribution of the population in Sinop resembles the population in England and Wales. This population is older than the World population, and even than the general population of Turkey. So, the rates of the SINOPsy must be regarded as the lower end of psychoses in Turkey, which increased after standardisation with the World population.

Turkey is a country that lies between a developed and a developing country, considering factors such as per capita gross domestic product, infant mortality rate and life expectancy (Hamadeh, van Rompaey, Metreau, & Eapen, 2022). Therefore, it would be useful to compare incidence rates in Turkey to the similar countries (Bastien et al., 2023). Few studies have been conducted on the incidence rate of psychotic disorders in upper middle-income countries. Early findings reported that incidence rates of schizophrenia in three developing countries (India, Nigeria, and Russia) were similar to those found in SINOPsy (Jablensky et al., 1992). On the other hand, incidence rates in India were slightly higher than the rates of any psychotic disorder documented in our study, whereas lower rates were reported in Nigeria and Russia (Jablensky et al., 1992). However, methodological differences between SINOPsy and the WHO 10-study make comparisons difficult (Bastien et al., 2023).

A study employing similar inclusion and exclusion criteria to SINOPsy documented incidence rates for all psychoses ranging from 31 to 46 per 100 000 across three developing countries, Nigeria, Trinidad, and India (Morgan et al., 2016). In a national registry-based analysis, the incidence of non-affective psychoses

Table 3. Crude incidence rates for sex, age and urbanicity by diagnosis in the catchment area

	Denominator	Cases	Incidence[a]	Cases	Incidence[a]	Cases	Incidence[a]	Cases	Incidence[a]
	73 893		Any psychotic disorder		Schizophrenia		Other psychotic disorders		Affective psychoses
Sex									
Male	36 895	52	34.8 (18.9–50.6)	16	10.7 (4.5–16.9)	15	10.0 (3.1–17.0)	21	14.0 (6.8–21.2)
Female	36 998	63	42.2 (25.7–58.8)	16	10.7 (5.4–16.0)	15	10.1 (4.9–15.2)	32	21.4 (10.7–32.2)
Age at onset									
15–24	16 537	39	58.4 (23.8–93.0)	15	22.4 (8.7–36.2)	6	9.0 (−1.2–19.2)	18	26.9 (9.9–43.9)
25–34	15 133	35	57.2 (26.1–88.3)	5	8.2 (1.1–15.2)	11	18.0 (6.2–29.7)	19	31.1 (11.3–50.9)
35–44	13 860	23	41.1 (18.7–63.4)	6	10.7 (2.4–19.0)	7	12.5 (−0.1–25.1)	10	17.8 (3.4–32.3)
45–54	14 931	14	23.2 (8.2–38.2)	3	5.0 (−0.7–10.6)	5	8.3 (1.1–15.4)	6	9.9 (0.9–19.0)
55–64	13 432	4	7.4 (0.2–14.5)	3	5.5 (−0.7–11.8)	1	1.8 (−1.8–5.5)	0	–
Urbanicity									
Rural	27 736	37	33.0 (19.3–46.7)	11	9.8 (3.6–16.0)	10	8.9 (3.5–14.3)	16	14.3 (5.6–22.9)
Semi-urban	18 756	25	33.0 (18.5–47.4)	11	14.5 (6.3–22.7)	3	3.9 (−0.5–8.4)	11	14.5 (4.8–24.2)
Urban	27 401	53	47.9 (24.9–70.8)	10	9.0 (1.8–16.2)	17	15.3 (6.3–24.4)	26	23.5 (11.1–35.8)

[a]Given per 100 000 per years with 95% CIs.

Table 4. Incidence rate ratios for sex, age and urbanicity by diagnosis[a]

	Unadjusted IRR	Adjusted IRR[b]	Unadjusted IRR	Adjusted IRR[b]	Unadjusted IRR	Adjusted IRR[b]	Unadjusted IRR	Adjusted IRR[b]
	Any psychotic disorder		Schizophrenia		Other psychotic disorders		Affective psychoses	
Sex								
Male	Ref		Ref		Ref		Ref	
Female	1.2 (0.8–1.8)	1.2 (0.6–2.3)	1.0 (0.5–2.1)	1.0 (0.3–3.3)	1.0 (0.4–2.2)	1.0 (0.3–3.4)	1.5 (0.8–2.8)	1.5 (0.6–3.9)
Age at onset								
15–24	**7.9 (2.8–30.5)**	**9.7 (1.6–57.7)**	**4.1 (1.1–21.9)**	5.0 (0.6–42.5)	4.9 (0.6–224)	6.0 (0.2–232)	**2.4 (0.9–7.5)**	**3.0 (0.4–12.1)**
25–34	**7.8 (2.8–30.1)**	**8.7 (1.4–52.2)**	1.5 (0.3–9.5)	1.7 (0.1–19.8)	**9.7 (1.3–420)**	11.0 (0.3–377)	**2.6 (1.0–8.2)**	**3.4 (0.7–16.5)**
35–44	**5.6 (1.9–22.2)**	5.7 (0.9–36.0)	1.9 (0.4–11.9)	2.0 (0.2–21.9)	**6.8 (0.9–305)**	7.0 (0.2–261)	1.6 (0.5–5.4)	1.8 (0.2–10.7)
45–54	**3.1 (1.0–13.1)**	3.5 (0.5–23.8)	0.9 (0.1–6.7)	1.0 (0.1–15.9)	**4.5 (0.5–212)**	5.0 (0.1–204)	Ref	
55–64	Ref	Ref	Ref	Ref	Ref		NA	
Urbanicity								
Rural	Ref		Ref		Ref		Ref	
Semi-urban	1.0 (0.6–1.7)	0.9	1.5 (0.6–3.8)	1.3 (0.3–5.6)	0.4 (0.1–1.7)	0.4 (0.1–3.7)	1.0 (0.4–2.3)	0.9 (0.2–3.4)
Urban	**1.4 (0.9–2.3)**	**1.4 (0.7–2.9)**	0.9 (0.4–2.4)	0.9 (0.2–3.9)	1.7 (0.7–4.2)	**1.7 (0.4–8.5)**	1.6 (0.8–3.3)	**1.6 (0.6–4.5)**

IRR, Incidence rate ratio; bold means $p < 0.05$; NA, not appliable.
[a]Given with 95% CIs.
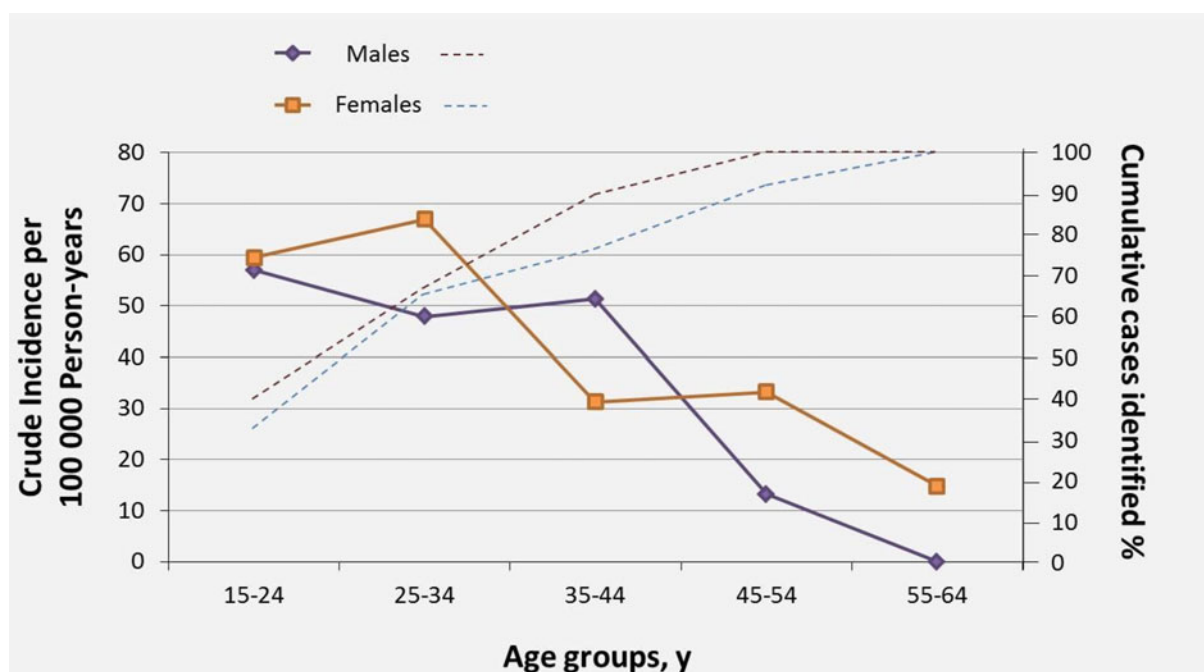[b]Adjusted for sex and age.

Figure 2. Crude incidence and cumulative percentage of psychotic disorders, by age and sex.

in Chile was reported to be 19 per 100 000 (González-Valderrama et al., 2022). The incidence of FEP in São Paulo, a large metropolis of Brazil, was relatively low and 16 per 100 000 (Menezes et al., 2007), however a recent study reported a higher incidence of 21 per 100 000 in another centre in Brazil (Jongsma et al., 2018). The treated incidence of FEP South Africa was 31 per 100 000 (Burns & Esterhuizen, 2008). In a setting geographically similar with SINOPsy, the incidence of first-contact psychosis was 30 per 100 000 in Greece (Peritogiannis, Mantas, Tatsioni, & Mavreas, 2013). Comparison with the rates from other developing countries indicate that incidence of psychotic disorders in Sinop may be lying at the middle of a heterogenous spectrum of rates.

We did not find evidence of gender differences in the incidence rates. Several studies have established higher incidence rates in men than women, particularly for schizophrenia (Jongsma et al., 2019; McGrath et al., 2004, 2008; Ochoa, Usall, Cobo, Labad, & Kulkarni, 2012). This striking finding could be related to the relatively small sample size. Alternatively, the absence of gender differences could be due to internal migration, where men may have greater residential mobility and vulnerable women reside in the region; however, there is no data to support the proposition that internal migration leads to gender differences. On the other hand, the findings of SINOPsy regarding the age-gender interaction in age of onset and age distribution replicated the main findings of previous research about the gender differences in disease course (Eranti, MacCabe, Bundy, & Murray, 2013; Ochoa et al., 2012). Men had earlier onset of psychotic disorders than women, broadly in line with previous studies (Eranti et al., 2013). Disease course for both genders was non-linear, and bi-modal in women, consistent with previous studies, which establish a single peak for men between 21 and 25 and two peaks for women, one between 25 and 30 and a later one at age 45 (Jongsma et al., 2019).

Our findings follow a spatial pattern in line with the wider psychiatric epidemiology literature, which suggests that any psychotic disorder is higher in urban than rural settings (March et al., 2008; Plana-Ripoll et al., 2018; Vassos et al., 2012). However, in the SINOPsy, although the sample size was relatively low and yielded wide and overlapping CIs, the higher rate in urban areas appears to stem from an increased risk of affective psychoses, not schizophrenia. This is contrast to much of the historical and contemporary research which repeatedly reported absence of spatial variation for affective psychoses and a strong urban-rural effect for non-affective psychoses (Van Os et al., 2010). World Mental Health Survey, which measured subclinical psychotic experiences within samples from different countries, provided evidence that urbanicity may not be associated with elevated odds for psychosis in developing countries (DeVylder et al., 2018). It is also possible that some studies may have lacked sufficient power to detect effect of urbanicity on affective psychosis considering the incidence of affective disorders is relatively rare. However, small sample sizes may not fully explain the contrasting finding as a recent review failed to detect variation in the rates of affective psychoses according to place (Fett, Lemmers-Jansen, & Krabbendam, 2019).

Although there is no previous data on the incidence of affective psychoses in the Black Sea region of Turkey, where Sinop is placed, there is an undocumented consensus among Turkish psychiatrists about the relative high prevalence of bipolar disorder in this area based on clinical experience (Akkaya et al., 2012). This uncertain but relative high rates could be associated with climate or local properties of the regional nutrition. A commonly consumed regional vegetable, collard green [Tr. *kara lahana*, Lat. Brassica oleracea] is known to be inhibiting iodine uptake (Stoewsand, 1995) which may subsequently lead to affective episodes with psychotic features. However, there is no specified study on this issue.

The current findings may suggest that risk factors associated with city living including deprivation, inequality, low social capital that render individuals prone to non-affective psychoses in the West Europe (Fett et al., 2019; March et al., 2008), may increase risk of affective psychoses in Turkey, but not schizophrenia. Further studies exploring these factors and how they contribute to the aetiology of psychotic disorders in Turkey are required.

The findings of the SINOPsy provide the opportunity to compare the rates with the rates on European immigrants from Turkey (Binbay et al., 2012). Incidence rates of non-affective psychoses are raised among immigrants from Turkey compared to native populations in Western Europe, especially for the second- and third-generation migrants in the Netherlands (Hogerzeil et al., 2017; Selten et al., 2012, 2020; Veling et al., 2008). The incidence rates of psychotic disorders (DSM-IV schizophrenia and other psychotic disorders) and schizophrenic disorders (DSM-IV schizophrenia, schizophreniform and schizo-affective disorders) were between 38.5 to 44.9 and 12.4 to 63.8 per 100 000 among immigrants from Turkey, respectively (Binbay et al., 2012). Incidence of bipolar disorder with psychotic features was 6.8 per 100 000 while incidence of depressive disorder with psychotic features was 13.4 per 100 000 (Selten, Van Os, & Nolen, 2003). The incidence rates in SINOPsy were lower than the rates among the immigrants with Turkish ancestry in the Netherlands. When the rates among Turkish immigrants are compared to rates in Sinop, the relative low rates add a challenging finding on the raised incidence of psychotic disorders in immigrant groups (Morgan et al., 2010; Selten et al., 2020).

Limitations

This is the first study to report incidence rates of psychotic disorders in Turkey using a uniform methodology similar to international studies. However, the results should be considered with several limitations. *First*, despite efforts to find, cases might be still missed. We tried to compensate this point with a 6-month leakage period. Thus, some of the cases might be not included in the nominator. We also cannot rule out the possibility that some patients may be referred to outpatient/inpatient units in other provinces (e.g. Ankara, İstanbul). However, in this case, the rates presented in the SINOPsy can be considered as the lowest end of the incidence rate in the region.

Second, this study cannot rule out the possibility that few, but some patients might have been admitted to private practice offices in other cities, which falls out of any registry system. *Third* some patients who were not admitted to any health care facility in the catchment area will be missed. Furthermore, variations in referral procedures of patients with psychosis to the only mental health care setting in the catchment area may have influenced the rates. This may have influenced rates across districts (and also rates on urbanicity). *Fourth*, this study is based on a denominator from the official statistics. The actual denominator might be different and vary over time. However, the residential instability of the catchment area was limited. Fifth, the case ascertainment process of the SinoPsy may have led to missing some cases, and a kind of selection bias. Sixth, rates we reported reflect treated incidence of psychotic disorders, and actual burden of psychoses is probably higher than our rates. Seventh, when comparing rates with the other studies, particularly with the rates of Turkish migrants in the Netherlands, caution should be paid to differences in methods; cause incidence rates are affected by first contact or longitudinal register approaches (Hogerzeil et al., 2017). Finally, analyses were adjusted just for age and sex, the possibility of unknown or unmeasured confounding remains.

Conclusion

The SINOPsy study was the first to report incidence rate of any psychotic disorder in Turkey. We reported the incidence of FEP

to be relatively high, but lower than immigrants in European countries with a Turkish ancestry. Furthermore, the urbanicity effect on psychosis may be different in countries and cultures like Turkey, though this remains to be explored in metropolitan areas. The relative high number of studies conducted in high-income countries might be leading biased estimates of psychosis epidemiology and more studies are needed in developing and developed countries.

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