

## Letter to the Editor



## Disparity Management Outcomes for Patients with Severe Mental Disorders in Sichuan Province: A Preliminary Evaluation from the National Surveillance Dataset\*

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The community is a necessary environment with the help of which people with mental disorders can be rehabilitated and can return to society. The WHO (World Health Organization) advocates that mental health services should be available at the grassroots level and be integrated systematically into the primary healthcare (PHC) system<sup>[1]</sup>. The WHO's Comprehensive Mental Health Action Plan 2013-2020 also sets one of the four objectives in community-based settings: the provision of comprehensive, integrated mental health and social care services<sup>[2]</sup>. According to the WHO's Project Atlas, published in 2001, community care facilities for mental health exist in 63.4% of countries ( $n = 183$ ), covering 79.9% of the world's population<sup>[3]</sup>. Specialists and researchers in numerous countries have recognized and affirmed the effectiveness of community-based management for mental disorders<sup>[4,5]</sup> associated with the reform<sup>[6,7]</sup>.

Since 2004, China's community-based management system (CBMS) for individuals with severe mental disorder (SMD) has been piloted among two districts in each of the 30 provinces in the mainland and formally scaled up to the whole nation in 2009<sup>[8]</sup> as a new medical reform task and a component in the National Basic Public Health Services. The SMD cares for patients with the following six diagnoses: schizophrenia, schizoaffective disorder, paranoid psychosis, bipolar affective disorder, mental disorders due to epilepsy, and mental retardation by the Chinese Classification of Mental Diseases, 3<sup>rd</sup> edition (CCMD-3)<sup>[9]</sup>. In order to deliver a series of services such as screening, diagnosis, treatment, and management of patients

with SMD in communities, the CBMS in China has formalized a general mechanism of coordination of health departments of five levels: state, province, prefecture city, county, and community. In parallel with the CBMS, an information management system (IMS) for managing SMD has also been developed since 2006. This study intends to present the urban-rural disparity utilization in CBMS in Sichuan Province, using the IMS database with 155,842 SMD patients (up to February 2014), in order to alert health policy decision-makers and researchers who study severe mental disorders.

When the '686' program was being conducted in China, the IMS database of Sichuan Province for the CBMS started the running tests in 2006. During the first four years until 2009, less than 400 SMD patients were registered in the system (Table 1). Following the 1<sup>st</sup> Specification policy issued in 2009, there was an observation of rapid increase of registered SMD patients. Due to the further improvements for registered patients, the 2<sup>nd</sup> Specification was issued in 2012 and the IMS was launched to be implemented throughout China. By the end of 2013, 131-327 patients with SMD were recorded in the IMS, of which 77.3% of them came from rural areas. Based on the population census data in 2013, the detection rate (DR) of patients with SMD was 1.68% for urban, 1.60% for rural, and 1.62% for the overall population. Further, the DR increased considerably to 3.58% and 4.31% in 2014 and in 2015, respectively. Overall, a large number of SMD patients were identified and managed in the CBMS during the last 10 years (linear trend  $\chi^2 = 1221014.587$ ,  $P < 0.001$ ).

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The GIS maps noticeably showed the improvement of DRs from 2010 to 2013 in prefecture cities in Sichuan Province (Supplementary Figures S1-S4 available in [www.besjournal.com](http://www.besjournal.com)). However, as the IMS officially implemented from 2012, the DR in rural residents was consistently lower than that in urban residents, either than that in the overall population.

Because the data from 2014 and 2015 were not openly accessible, we only used data up to 2013 for follow-up analysis. Among 154,725 patients (up to the end of 2013), 83.9% were diagnosed with schizophrenia, 7.8% with mental retardation, 4.0% with mental disorders due to epilepsy, 2.5% with bipolar affective disorder, 1.5% with schizoaffective disorder, and 0.3% with paranoid psychosis. The categories of SMD from the Sichuan IMS were consistent with those of the national epidemiological survey<sup>[10]</sup>. Accordingly, by the end of 2013, the overall DR of 1.62% in our calculation (2.41% in IMS) was also lower in comparison with the national standard (2.62%)<sup>[11]</sup> and Jiangsu Province (2.86%)<sup>[11]</sup> in the east of China.

One of the main goals of management in the CBMS was to reduce dangerous behavior in psychiatric patients by increasing medication compliance to improve treatment effects. In Table 2, the three most important patient outcomes during 2009-2013 indicated a considerable difference between urban and rural patients. Consistently, patients in rural areas had higher dangerous behavior (DB) except for the year 2009. More

patients not on medication compliance (MC), those in less stable conditions (SC), having fewer treatment effects (TE) than those in urban areas were found. Correspondingly, the outcomes demonstrated that over time, DB of patients both in rural and urban areas substantially declined in conjunction with an improved stabilization of conditions during the same period. However, the trends from 2010 to 2013 in proportions of patients without medication in rural areas had noticeably increased over time, as compared to a slight increase among urban patients over time. The impacts of treatment, for example, recuperation and changes in patient's condition, evaluated by the clinical diagnosis, indicated minimal improvement among rural patients and declined effects among urban patients over time.

In view of the fact that controlling and decreasing of DB was one of the main goals for management of patients with SMD in the CBMS, the paper calculated the incidence of DB of SMD patients, from the perspective of epidemiology, using the IMS database of Sichuan Province from 2006 to 2013 to further detect the disparity utilization in management services as shown in Table 3. In total, the incidence of DB of SMD patients in urban areas was lower than that in rural areas in 70% of cities. In other words, management in the CBMS of patients with SMD in rural areas generally has a lower effectiveness compared with urban citizens.

The Chinese government attaches importance to SMD, with a series of policies issued to protect the

**Table 1.** Detection rate of SMD in Sichuan province by year

Year	Urban residents			Rural residents			All residents		
	Population (10,000) <sup>a</sup>	SMD patients	Detectionrate (%)	Population (10,000) <sup>b</sup>	SMD patients	Detectionrate (%)	Population (10,000) <sup>a</sup>	SMD patients	Detectionrate (%)
2006	1,663	0	0.00000	6,506	6	0.00009	8,169	6	0.00007
2007	1,600	3	0.00019	6,527	40	0.00061	8,127	43	0.00053
2008	1,586	11	0.00069	6,552	75	0.00114	8,138	86	0.00106
2009	1,642	59	0.00359	6,543	320	0.00489	8,185	379	0.00460
2010	1,558	1,039	0.06669	6,487	6,046	0.09320	8,045	7,085	0.08807
2011	1,617	15,575	0.96320	6,433	66,549	1.03449	8,050	82,124	1.02017
2012	1,655	25,220	1.52387	6,421	97,668	1.52107	8,076	122,888	1.52164
2013	1,772	29,746	1.67867	6,335	101,581	1.60349	8,107	131,327	1.61992
2014	1,675	73,887 <sup>c</sup>	4.41116	6,465	217,418 <sup>c</sup>	3.36300	8,140	291,305 <sup>c</sup>	3.57869
2015	1,887	116,141 <sup>c</sup>	6.15480	6,317	237,523 <sup>c</sup>	3.76006	8,204	353,664 <sup>c</sup>	4.31087

**Note.** <sup>a</sup>Statistical Yearbook of the National Health and Family Planning Commission (2007-2016). <sup>b</sup>Sichuan Statistical Yearbook. <sup>c</sup>Unpublished conference presentations by Sichuan Mental Health Center in 2016. SMD, severe mental disorder.

rights of patients with SMD and integrated and systematic management and plans conducted to guarantee management effectiveness. Further, the CBMS for SMD patients in China, especially after the 686 program and the Specifications were launched, has formed an active structure and made certain advancements<sup>[12]</sup>. Furthermore, this study confirmed some positive implementations of the system along with the current management structure and health system inputs. Additionally, we distinguished the urban–rural disparity management and utilization issue to ensure progress for decision-makers and researchers who are associated with this domain.

The DR is also known as the registration rate of patients with SMD and is much lower than the prevalence of SMD among the population. A previous large epidemiological survey conducted during 2001-2005 in the four provinces of China reported an adjusted 1-month prevalence of psychotic disorder at 1.0% (95% CI, 0.8–1.1)<sup>[10]</sup>. The reason for the low DR is that two-thirds of known patients with SMD were not managed in the CBMS: (1) about one-third of patients whose condition was stabilized or recovered after clinic treatment and (2) about one-third of patients who were long-term institution-bound and harmless to the society or others. Nevertheless, one could still use the information system to assess the relative quality and management effects of the SMD by comparing DR or outcome measures of patients between regions over time.

By using the Sichuan IMS database, we found similar DR between urban and rural areas, but the

management outcomes of patients in rural areas were worse than those in urban areas. Over time, the increased DR analysis enabled us to identify the positive response of CBMS to the policies in promoting and supporting the implementation of the system in the year 2009 and 2011 in particular. Over the last five years, increased problems faced by patients, such as the lack of medicines in rural areas and the declined treatment effects faced particularly by patients in urban areas, have raised concerns about the management quality of CBMS. Subsequently, in this study, we demonstrated how indicators not assessed by the government did not show the expected change pattern as compared to indicators assessed by the government. So, methods to evaluate the actual management effect by deeply and systematically using the indicators in IMS is the next topic for research.

However, some limitations of the study should be noted. First, one case study from Sichuan Province on the current status and possible effects of the CBMS may not be generally acceptable to the developed provinces in China due to the vast diversity of sociocultural, economic, and care provision characteristics in different regions in China. Second, the empirical data on the management system was only up to the end of 2013 due to official restrictions to the access of the complete data. In addition, recent changes and improvements to the system are not reflected in this study. Third, the DR of SMD in the community could be underreported because of the inclusion and exclusion strategy that was much influenced by insufficient psychiatric

**Table 2.** Incidence number<sup>a</sup> and percentage (%) of patients' outcome over time by urban and rural areas

Year	DB <sup>b</sup>		P <sup>*</sup>	SC <sup>b</sup>		P <sup>*</sup>	MC		P <sup>*</sup>	TE		P <sup>*</sup>
	Urban	Rural		Urban	Rural		Urban	Rural		Urban	Rural	
2009	1 (2.13)	15 (4.82)	0.225	21 (44.68)	74 (23.79)	0.001	4 (8.51)	93 (29.90)	< 0.001	33 (70.21)	148 (47.58)	0.028
2010	22 (2.30)	365 (3.37)	0.075	305 (31.90)	2,994 (27.63)	< 0.001	176 (18.41)	3,625 (33.45)	< 0.001	607 (63.49)	5,710 (52.69)	< 0.001
2011	766 (2.45)	6,031 (3.98)	< 0.001	16,114 (51.49)	61,688 (40.70)	< 0.001	6,401 (20.45)	54,948 (36.25)	< 0.001	19,433 (62.09)	84,344 (55.64)	< 0.001
2012	659 (0.83)	6,123 (1.69)	< 0.001	49,421 (62.44)	178,321 (49.22)	< 0.001	17,476 (22.08)	156,656 (43.24)	< 0.001	47,667 (60.23)	188,271 (51.97)	< 0.001
2013	528 (0.55)	4,629 (1.18)	< 0.001	68,208 (70.50)	241,419 (61.72)	< 0.001	22,555 (23.31)	182,173 (46.58)	< 0.001	55,298 (57.15)	200,681 (51.31)	< 0.001
P <sup>**</sup>	< 0.001	< 0.001		< 0.001	< 0.001		< 0.001	< 0.001		< 0.001	< 0.001	

**Note.** <sup>a</sup>One patient can have a number of observations under each outcome reported each year. <sup>b</sup>Definition in Appendix. \* P value of chi-square test for area difference,  $\alpha = 0.05$ . \*\* P value of chi-square test for linear trend test,  $\alpha = 0.05$ . DB, dangerous behavior; MC, medication compliance; SC, stable conditions; TE, treatment effects.

working forces in the province.

In conclusion, since the central funding was presented for PHC service, positive evidence is needed to show whether the amount of funding for the CBMS was sufficient to improve the management effect. Although the tiered multidisciplinary administrative and service structure was established for SMD patients with a monitory system to assess registration rate and risk behavior of patients, the service quality and efficiency of the CBMS require positive evidence. Further research should also pay attention to the large rural-urban disparity and possible reasons in the CBMS management effects concerning patient outcomes such as high-risk behavior, stability of mental health condition, medication adherence, etc. The IMS is an important surveillance database that has yet to be

used to effectively generate evidence to reflect problems in the operation of the CBMS and to assess the performance of the CBMS work group among prefectures.

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#### AUTHOR CONTRIBUTIONS

TANG Wei Wei and LIU Yuan Yuan participated in the study design, literature search, data analysis and data interpretation, and drafting the manuscript;

**Table 3.** Incidence of dangerous behavior of SMD patients in Sichuan from 2006 to 2013 (%)

Cities	Urban areas				Rural areas				Total			
	Patients	Number of dangerous behaviors <sup>a</sup>	Person-years of follow-up <sup>b</sup>	Incidence <sup>c</sup> (%)	Patients	Number of dangerous behaviors <sup>a</sup>	Person-years of follow-up <sup>b</sup>	Incidence <sup>c</sup> (%)	Patients	Number of dangerous behaviors <sup>a</sup>	Person-years of follow-up <sup>b</sup>	Incidence <sup>c</sup> (%)
Chengdu	186	643	12,691.84	5.07	752	3,593	30,991.62	11.59	1,019	4,533	49,507.46	9.16
Zigong	126	190	4,104.01	4.63	271	504	12,887.23	3.91	409	713	17,617.66	4.05
Panzhihua	8	20	252.39	7.92	83	138	641.32	21.52	94	164	1,043.76	15.71
Deyang	33	81	1,068.80	7.58	616	1,224	13,001.24	9.41	701	1,425	15,032.72	9.48
Mianyang	38	93	2,307.03	4.03	428	893	15,175.07	5.88	482	1,043	17,969.90	5.80
Guangyuan	33	96	609.14	15.76	449	1,307	5,056.00	25.85	492	1,430	6,025.88	23.73
Suining	18	35	630.86	5.55	159	279	6,756.65	4.13	188	362	7,739.69	4.68
Neijiang	60	82	2,030.25	4.04	303	652	13,041.09	5.00	394	787	16,164.13	4.87
Leshan	36	60	823.73	7.28	385	994	4,250.62	23.38	437	1,092	5,368.51	20.34
Nanchong	50	82	869.99	9.43	536	1,362	7,420.13	18.36	614	1,524	8,826.10	17.27
Meishan	12	16	675.79	2.37	119	257	7,602.75	3.38	133	275	8,564.64	3.21
Yibin	63	114	1,236.24	9.22	630	1,237	9,650.42	12.82	743	1,447	11,857.10	12.20
Guang'an	34	39	608.27	6.41	292	424	5,403.86	7.85	332	471	6,131.43	7.68
Dazhou	44	143	664.18	21.53	221	667	7,125.45	9.36	270	821	8,058.22	10.19
Ya'an	14	56	208.52	26.86	63	85	1,414.45	6.01	79	145	1,747.38	8.30
Bazhong	42	108	295.79	36.51	716	2,151	6,370.63	33.76	778	2,314	6,859.60	33.73
Ziyang	13	27	839.12	3.22	287	482	15,868.65	3.04	305	516	17,172.61	3.00
Luzhou	42	68	1,773.06	3.84	354	704	10,132.04	6.95	455	864	12,702.58	6.80
Aba	0	0	0.79	0.00	1	1	10.30	9.71	1	1	11.09	9.02
Liangshan	23	24	271.67	8.83	133	225	1,415.28	15.90	164	260	1,541.66	16.86
Total	875	1,977	31,700.10	6.24	6,798	17,179	174,214.80	9.86	8,090	20,187	219,942.12	9.18

**Note.** <sup>a</sup>Number of dangerous behaviors: records of risk assessment as level 3–5 (means dangerous behaviors) from 2,006 to 2,013. <sup>b</sup>Person-years of follow-up: total tal follow-up time for each patient from 2,006 to 2,013. <sup>c</sup>Incidence = number of dangerous behavior/person-years of follow-up × 100%.

WANG Dan and WEN Hong provided access to the dataset and interpretation of data. YANG Min designed the study, supervised data analysis, and provided critical revisions for the concepts and contents of the manuscript. All authors read and approved the final version of the manuscript for submission.

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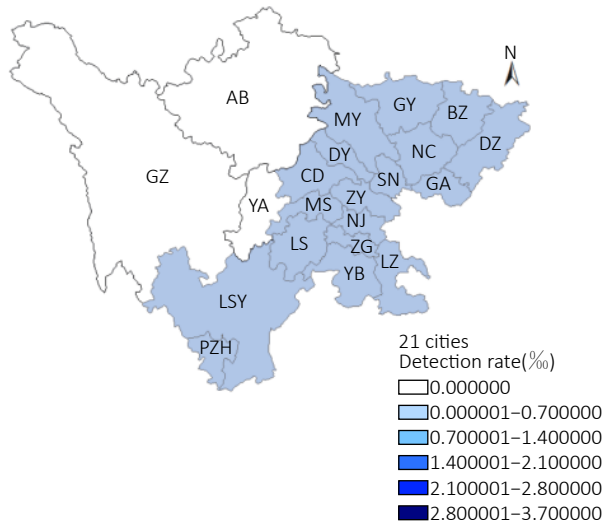
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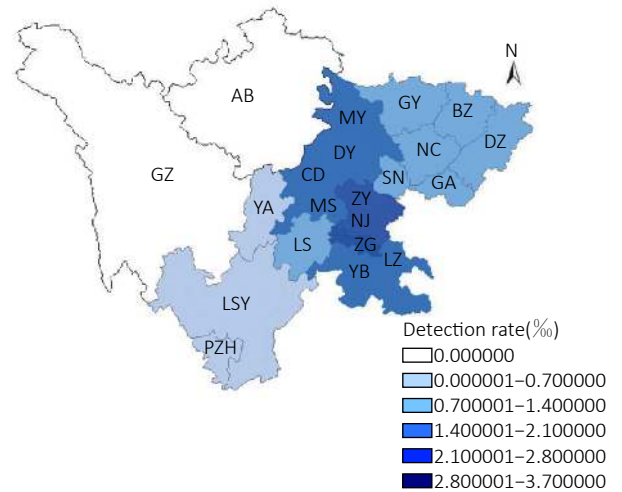
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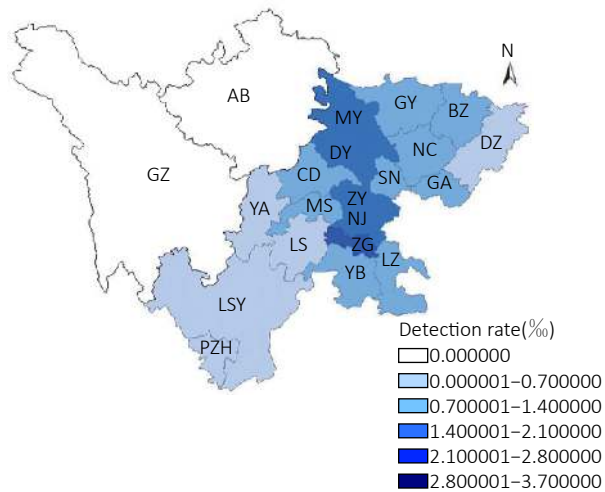
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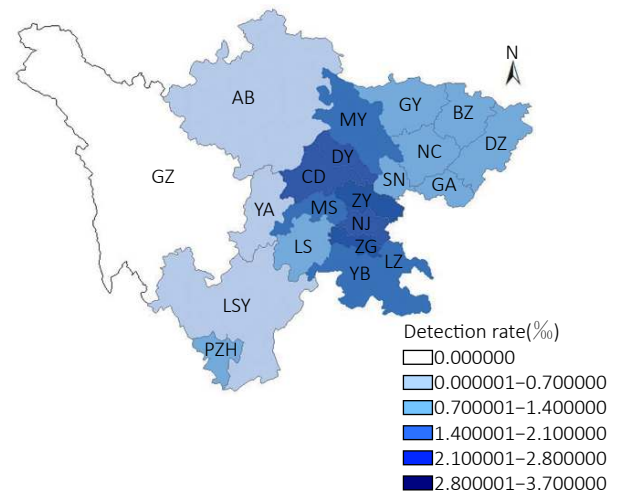
**Supplementary Figure S1.** Geographic spatial distribution of patient detection rate in Sichuan Province in 2010.



**Supplementary Figure S3.** Geographic spatial distribution of patient detection rate in Sichuan Province in 2012.



**Supplementary Figure S2.** Geographic spatial distribution of patient detection rate in Sichuan Province in 2011.



**Supplementary Figure S4.** Geographic spatial distribution of patient detection rate in Sichuan Province in 2013.