

Analysis of the Pressure Placed on Medical Systems During the COVID-19 Pandemic

Shanghai Zhi Information Technology Co., Ltd.
luke.han@kyligence.io

This project is based on publicly available data to estimate the stress on the health care system in various locations during the coronavirus outbreak.

Because the necessary data is so large, there is an urgent need to provide strong data service capabilities for more analysts and interconnected organizations by providing standardized data access interfaces.



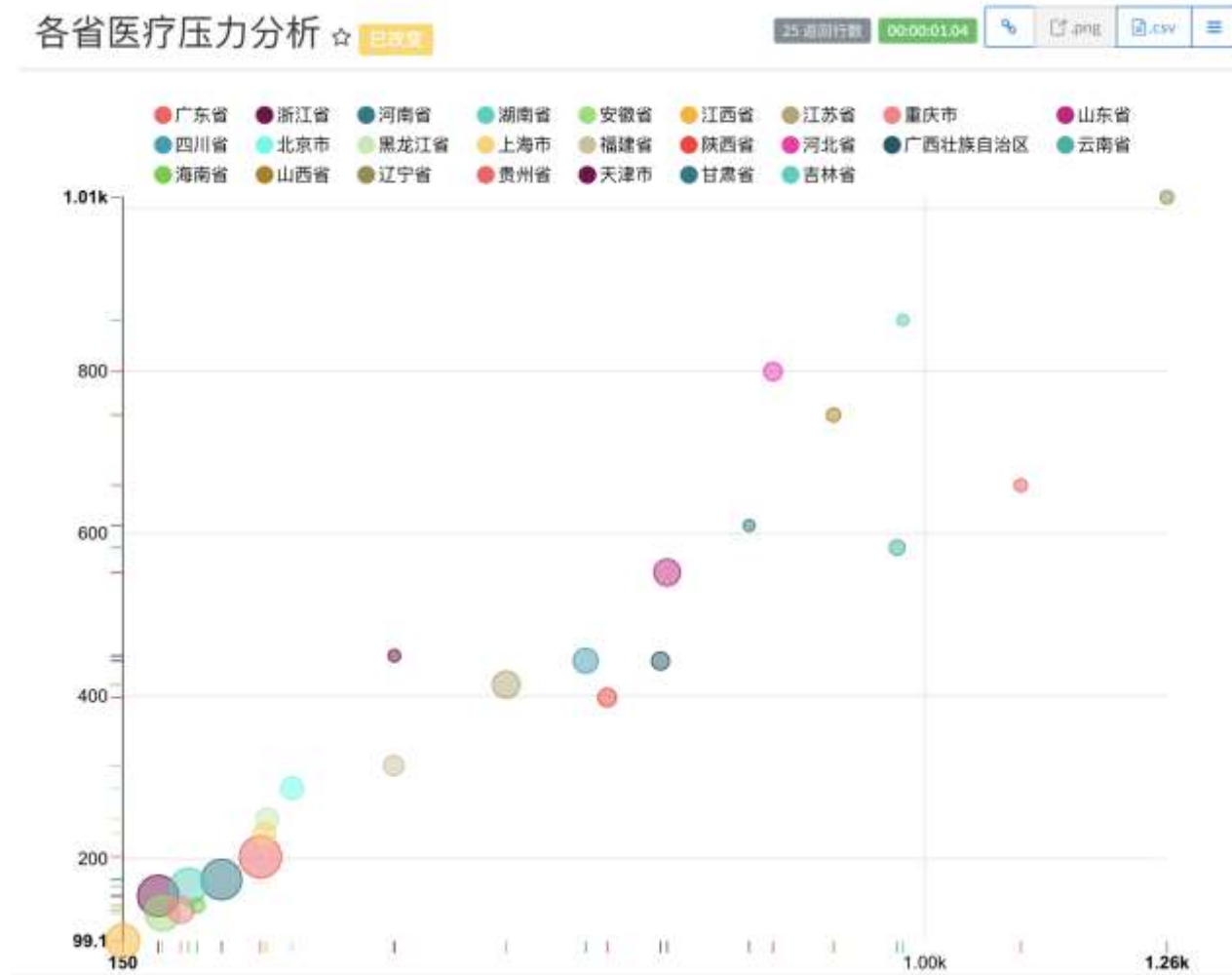
Sample Application - Pressure Estimation of Provincial Health Systems

- With a simple analysis, we can identify the current pressure points in each province
- Forecasting the flow of returning travelers allows for a quick glance at potential future outbreak trends and the regions most likely to experience increased pressure on their health systems
- Example data cutoff: 2020-02-09





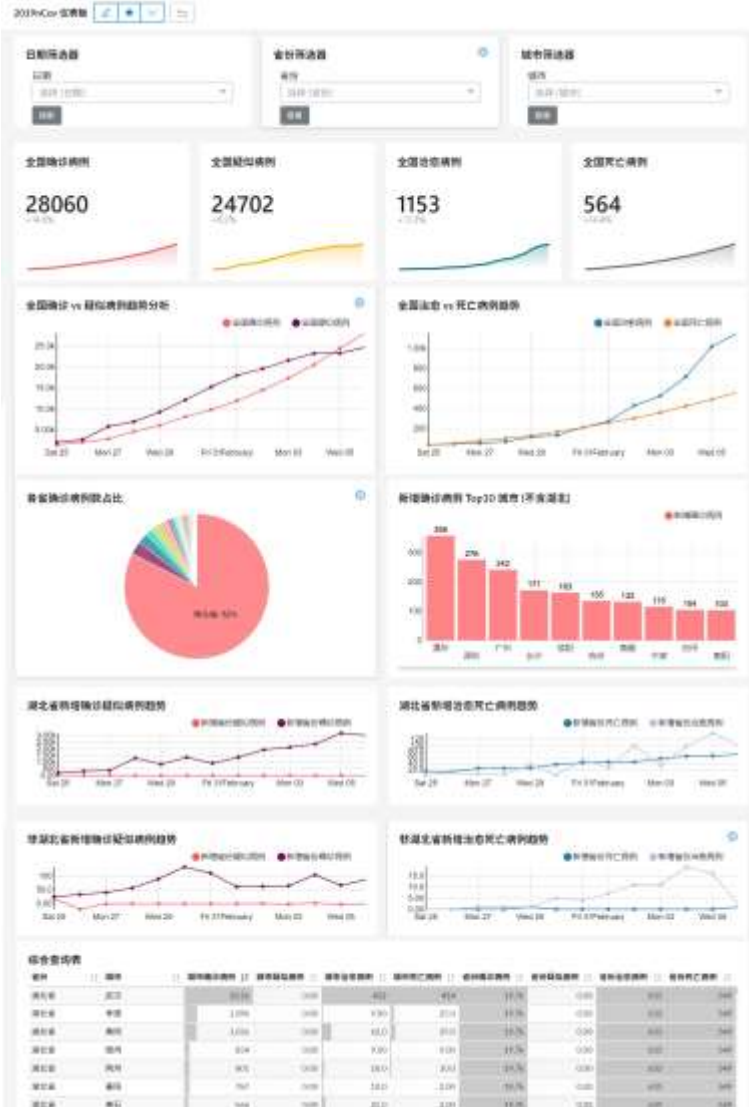
Example Application - Provincial (Non-Hubei) Medical System Pressure at a Glance



- In the bubble chart, we can see that Jiangxi Province is currently experiencing the greatest pressure on their system out of all the province cities – excluding Hubei.
- Shanghai's current system pressure is in the middle on this chart. If the outbreak prevention and control is insufficient, Shanghai's overall medical pressure will increase.



Sample Application - Universal Outbreak Surveillance Dashboard



Sample Application - Provincial Outbreak Surveillance Dashboard

MDX tset.xlsx

文件 开始 插入 页面布局 公式 数据 审阅 视图 加载项 帮助 BI Publisher 特色功能 Power Pivot 团队 数据透视表分析 设计 共享 批注

Calibri 11 A A

自定义

条件格式 常用表格格式 单元格格式

插入 删除 格式

排序和筛选 查找和选择

创建 敏感度 Jira Cloud

E7 0

行标签	城市确诊病例	城市死亡病例	城市疑似病例	城市治愈病例
上海市				
嘉定	2			
嘉定区	3			
外来来沪人员	79	1		5
奉贤	5			
奉贤区	5			
宝山	2			
宝山区	11			
崇明区	1			
徐汇	5			
徐汇区	11			
普陀区	7			
未知地区				5
杨浦	1			
杨浦区	5			
松江	3			
松江区	7			
浦东	25			
浦东区	25			
浦东新区	40			

Sheet2

数据透视表字段

选择要添加到报表的字段:

搜索

NCOV2019_AREA

城市

云南省确诊病例

128



云南省治愈病例

5

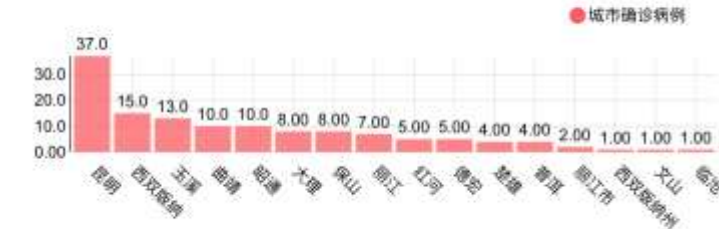


云南省死亡病例

0



云南省新增确诊病例

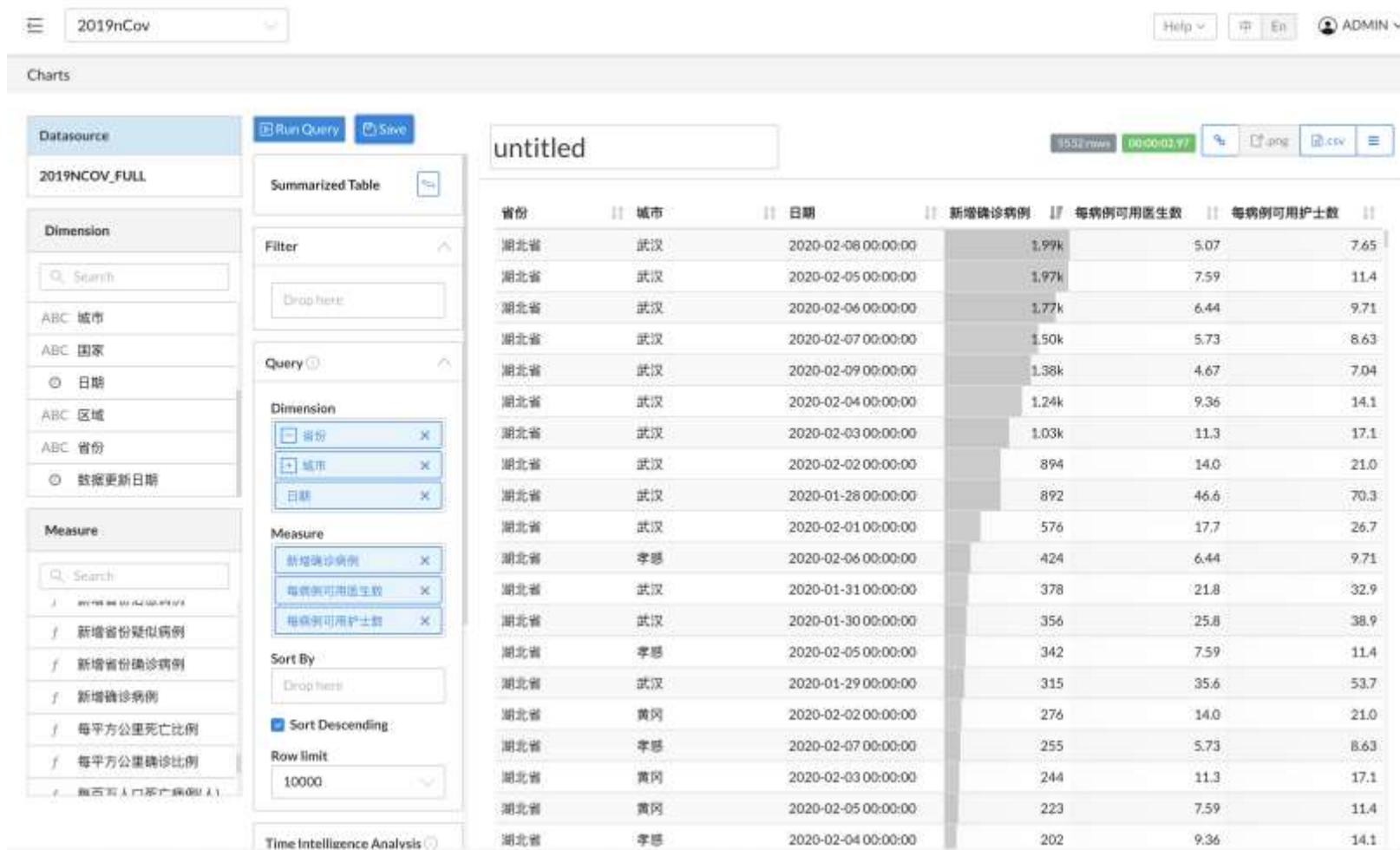


云南省确诊病例数占比



◆ Sample Application - In-Depth Analysis of Provincial Outbreaks - Advanced Analysis Capabilities

- Visual, multi-dimensional analytics enable medical, government and other relevant organizations (such as the CDC) to quickly make data-driven decisions based on reliable sources
- Bypass the need for further analysis or assistance from IT
- Supports all mainstream BI tools



◆ Sample Application - Standard Data Access - SQL Interface

- The Kylogence platform provides a standard SQL interface
- Enables analysts to quickly and effectively analyze standardized data that has been managed and combined with more datasets
- Easy to cross-match and provide timely data support for key decisions

The screenshot displays the Kylogence SQL interface. On the left, the 'Data Source' panel shows a search bar and a tree view under 'Source: Hive' with folders like 'DEFAULT (Default)', 'CITY', 'NCOV2019', 'NCOV2019_AREA', and 'NCOV2019_FULL'. The 'NCOV2019_FULL' folder is expanded, showing columns such as 'CITYNAME', 'CITY_CONFIRMED...', 'CITY_CONFIRMED...', 'CITY_CURED...', 'CITY_CURED...', 'CITY_DEAD...', 'CITY_DEAD...', 'CITY_SUSPECTED...', 'CITY_SUSPECTED...', 'CONFIRMEDCOUNT', 'CONFIRMEDCOUNT...', 'COUNTRYNAME', 'CURED...', 'CURED...', and 'CURED..._LD'.

The main area is the 'SQL Editor' with tabs for 'query2' and 'query1'. It contains a SQL query that selects city names, dead counts, confirmed counts, and cured counts from the 'NCOV2019_FULL' table, filtered by province ('湖北省'). The query is as follows:

```
1 SELECT
2   NCOV2019_FULL.CITYNAME AS "NCOV2019_FULL.CITYNAME",
3   SUM (NCOV2019_FULL.DEADCOUNT) AS "DEADCOUNT",
4   SUM (NCOV2019_FULL.CONFIRMEDCOUNT) AS "CONFIRMEDCOUNT",
5   SUM (NCOV2019_FULL.CURED...) AS "CURED..."
6 FROM
7   "DEFAULT"."NCOV2019_FULL" AS "NCOV2019_FULL"
8 LEFT OUTER JOIN "DEFAULT"."CITY" AS "CITY" ON "NCOV2019_FULL"."CITYNAME" = "CITY"."CITYNAME"
9 AND "NCOV2019_FULL"."PROVINCENAME" = "CITY"."PROVINCENAME"
10 WHERE
11   NCOV2019_FULL.PROVINCENAME IN ('湖北省')
12 GROUP BY
```

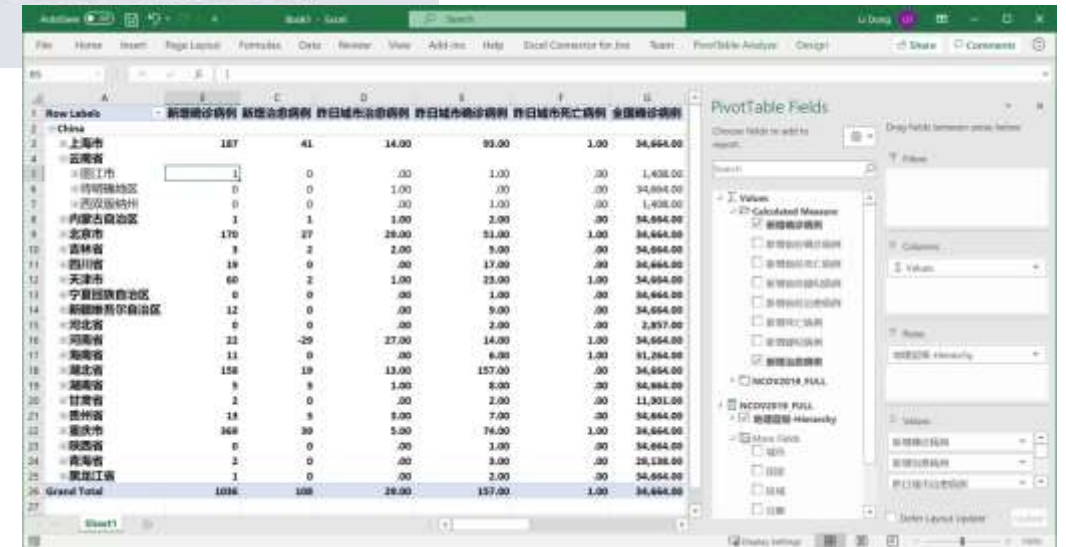
Below the editor, the 'Query Information' section shows the Query ID: d8862995-4b1c-45e6-ad06-ad6844114e6c, Duration: 0.33s, and Answered By: NCOV2019_FULL. The 'Query Results' section shows a table with 4 rows of data:

NCOV2019_FULL.CITYNAME	DEADCOUNT	CONFIRMEDCOUNT	CURED...
武汉	4024	87804	4183
黄冈	269	15873	575
孝感	200	15221	173
鄂州	159	4101	106

◆ Sample Application - Standard Data Access - MDX Interface

- MDX is Microsoft's published data analysis protocol, supported by most analytical tools
- Simple, intuitive expression allows non-technical analysts to quickly get started
- Supports Excel
- Enables more analytical capabilities
- Supports a wide range of analysis scenarios

```
SELECT {[Measures].[新增确诊病例],[Measures].[新增治愈病例],  
[Measures].[昨日城市治愈病例],[Measures].[昨日城市确诊病例],  
[Measures].[昨日城市死亡病例],[Measures].[全国确诊病例]}  
DIMENSION PROPERTIES PARENT_UNIQUE_NAME ON COLUMNS ,  
NON EMPTY  
Hierarchize(AddCalculatedMembers(DrilldownMember({{Drilldown  
Member({{DrilldownLevel({[NCOV2019_FULL].[地理层级-Hierarchy].  
[All]}}, {[NCOV2019_FULL].[地理层级-Hierarchy].[China]}},  
{[NCOV2019_FULL].[地理层级-Hierarchy].[China].[云南省]})))  
DIMENSION PROPERTIES PARENT_UNIQUE_NAME ON ROWS  
FROM [2019nCov_MDX] CELL PROPERTIES VALUE,  
FORMAT_STRING, LANGUAGE, BACK_COLOR, FORE_COLOR,  
FONT_FLAGS
```



The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable has 'Row Labels' and 'Values'. The 'Row Labels' are categorized by 'China' and '云南省'. The 'Values' are calculated measures: '新增确诊病例' (New Confirmed Cases), '新增治愈病例' (New Cured Cases), '昨日城市治愈病例' (Yesterday's City Cured Cases), '昨日城市确诊病例' (Yesterday's City Confirmed Cases), '昨日城市死亡病例' (Yesterday's City Death Cases), and '全国确诊病例' (National Confirmed Cases). The data is summarized in the following table:

Row Labels	新增确诊病例	新增治愈病例	昨日城市治愈病例	昨日城市确诊病例	昨日城市死亡病例	全国确诊病例
China	187	41	14.00	93.00	1.00	34,664.00
云南省	1	0	0.00	1.00	0.00	1,436.00
昆明市	0	0	1.00	1.00	0.00	34,664.00
曲靖市	0	0	0.00	1.00	0.00	1,436.00
昭通市	1	1	1.00	2.00	0.00	34,664.00
普洱市	170	27	28.00	51.00	1.00	34,664.00
临沧市	8	2	2.00	5.00	0.00	34,664.00
红河州	19	0	0.00	17.00	0.00	34,664.00
文山州	60	2	1.00	23.00	1.00	34,664.00
西双版纳州	0	0	0.00	1.00	0.00	34,664.00
大理州	12	0	0.00	5.00	0.00	34,664.00
怒江州	0	0	0.00	2.00	0.00	2,857.00
迪庆州	22	29	27.00	14.00	1.00	34,664.00
德宏州	11	0	0.00	6.00	1.00	81,284.00
保山市	158	19	13.00	157.00	0.00	34,664.00
楚雄州	8	8	1.00	8.00	0.00	34,664.00
普洱市	1	0	0.00	2.00	0.00	11,901.00
昆明市	18	8	5.00	7.00	0.00	34,664.00
昆明市	368	39	5.00	74.00	1.00	34,664.00
昆明市	0	0	0.00	1.00	0.00	34,664.00
昆明市	3	0	0.00	3.00	0.00	28,138.00
昆明市	1	0	0.00	2.00	0.00	34,664.00
Grand Total	1036	108	28.00	157.00	1.00	34,664.00

◆ Sample Data - Sorted into a Standard Dataset Based on the Classic Number of Warehouse Silos Theory

1	字段	中文别名	描述
2	DATE	日期	日期
3	COUNTRYNAME	国家	国家
4	PROVINCENAME	省份	省份
5	CITYNAME	城市	城市
6	DISTINCTNAME	区域	区域
7	UPDATETIME	数据更新时间	数据更新时间
8	SUSPECTEDCOUNT	疑似病例	疑似病例
9	CONFIRMEDCOUNT	确诊病例	确诊病例
10	CURED_COUNT	治愈病例	治愈病例
11	DEADCOUNT	死亡病例	死亡病例
12	SUSPECTEDCOUNT_LD	昨日疑似病例	昨日疑似病例
13	CONFIRMEDCOUNT_LD	昨日确诊病例	昨日确诊病例
14	CURED_COUNT_LD	昨日治愈病例	昨日治愈病例
15	DEADCOUNT_LD	昨日死亡病例	昨日死亡病例
16	PROVINCE_CONFIRMEDCOUNT	省份确诊病例	省份日累计确诊病例数
17	PROVINCE_SUSPECTEDCOUNT	省份疑似病例	省份日累计疑似病例数
18	PROVINCE_CURED_COUNT	省份治愈病例	省份日累计治愈病例数
19	PROVINCE_DEADCOUNT	省份死亡病例	省份日累计死亡病例数
20	PROVINCE_CONFIRMEDCOUNT_LD	昨日省份确诊病例	前一天的省份日累计确诊病例数
21	PROVINCE_SUSPECTEDCOUNT_LD	昨日省份疑似病例	前一天的省份日累计疑似病例数
22	PROVINCE_CURED_COUNT_LD	昨日省份治愈病例	前一天的省份日累计治愈病例数
23	PROVINCE_DEADCOUNT_LD	昨日省份死亡病例	前一天的省份日累计死亡病例数
24	CITY_CONFIRMEDCOUNT	城市确诊病例	城市日累计确诊病例数
25	CITY_SUSPECTEDCOUNT	城市疑似病例	城市日累计疑似病例数
26	CITY_CURED_COUNT	城市治愈病例	城市日累计治愈病例数

