

# Assessment of the Efficiency of hospitals before and after the implementation of the Health Reform Plan in Qazvin province based on the Pabon Lasso model (2011-2016)

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## Abstract

**Introduction:** In order to measure the efficiency of hospitals, various approaches have been proposed, which among them the Pabon Lasso model graphically evaluates the performance of hospitals. Therefore, the aim of this study was to evaluate the performance of hospitals affiliated to Qazvin University of Medical Sciences three years before and after implementation of the Health Reform Plan.

**Method:** This study was descriptive-analytic and evaluated the performance of 6 Public hospitals and 5 private hospitals of Qazvin University of Medical Sciences in the 3 years before (2011-2013) and 3 years after (2014-2016) the implementation of the Health Reform Plan with the Pabon Lasso model. In this model, three indicators (bed turnover, bed occupancy and average length of stay) were used simultaneously. Data was collected using a standard checklist. SPSS software was used to analyze the data.

**Results:** The results showed that the average of three indicators in public hospitals (bed turnover, bed occupancy rate and hospital stay) has changed from 59.61 to 77.63, 61.13 to 75.75 and 4.96 to 5.15, respectively, and in private hospitals, respectively, from 109.33 to 92.81, 63.23 to 54.73, 2.3 to 2.2.

**Conclusion:** In general, performance indicators of hospitals affiliated to Qazvin University of Medical Sciences are in a desirable condition regarding standards. However, with the implementation of the Health Reform Plan and the reduction of out of the pocket patients in public hospitals, they have increased the number of patients referred to these hospitals and their transfer to the fourth zone. Therefore, measures should be taken to use the appropriate strategies for optimal and efficient use of resources for proper management.

**Key words:** Hospital, Health Reform Plan, Pabon Lasso, Qazvin

## Introduction

The health care system in Iran is a combination of health care providers in the public and private sectors, of which the public sector, in particular, the Ministry of Health and Medical Education, has a greater role to play in this regard. According to statistics, of about 62% of medical institutions affiliated to medical universities, 16% of the total health care facilities are available to the private sector, 0.08% of social security hospitals, 0.06% of military hospitals, 0.03% of charity hospitals and 0.05 are available to other hospitals (1,2).

Hospitals are one of the most important and costly components of health care systems that have allocated themselves more than two-thirds of health costs (3). Considering the significant contribution of the state budget to the health sector, the need for assessing the hospital's performance has not previously been covered (4). One of the methods for assessing how hospitals use the high volume of resources allocated to them is to evaluate performance using performance indicators (5). Effectiveness refers to the conditions in which a maximum output is obtained using a given amount of resources (6). One of the major problems in health systems in developing countries are inefficiencies in the allocation and use of inefficient resources(7).

In order to measure the efficiency of hospitals, a variety of approaches have been proposed, in which the Pabon Lasso model graphically evaluates the performance of hospitals (8). The Pabon Lasso model to compare the performance of different hospitals or different parts of a hospital uses a combination of Three indicators; bed turnover (BTO), bed occupancy (BOR) and average length of stay (ALS) (10,9). The percentage of bed occupancy represents the percentage of occupied beds in a hospital over a given period.(11) The bed turnover indicator is the number of times a patient uses a hospital bed, which is obtained from the ratio of the number of discharges to the average active bed occupation in a given period (12). The average length of the patient's stay is calculated from the total number of occupied beds at a given time in the number of discharged and deceased patients in the same period (13). The Pabon Lasso model represents the average of performance indicators and hospital performance levels (15). The first zone represents hospitals with bed occupants and low bed turnover (number of offered hospital beds is more than what is demanded). The second zone indicates a high bed turnover and low bed occupancy (unnecessary hospitalization and extra beds especially in gynaecology and obstetrics blocks). The Third zone, is there are hospitals with high bed turnover and low bed occupancy (these hospitals have desirable efficiencies; they also use the least number of beds they have) and in the fourth zone, high bed occupancy and bed turnover are low (longer hospitalizations, using less outpatient facilities, high costs especially in Psychiatric and Nursing homes) (10).

Initiation of the Health Reform Plan from early 2014 with seven service packages to reduce hospitalized patients' share of payments in hospitals related to the Ministry of

Health and Medical Education, support the retention of physicians in deprived areas, specialized physicians' residency programs in hospitals related to the Ministry of Health and Medical Education, Instruction for improving the quality of services provided in hospitals related to the Ministry of Health and Medical Education, Instruction for improving the quality of hotel services in hospitals related to the Ministry of Health and Medical Education, Instruction for the provision of financial support for incurable patients, other specific patients, and needy patients, Instruction for promoting natural childbirth. It is obvious that this design can be viewed from a variety of dimensions, from the perspective of later therapies and reduction of payment from the pocket of patients, but certainly the educational system of health, research and even cultural universities are also implementing this scheme now and more importantly into the future(16). Of course, it is worth noting that the induced demand phenomenon leads to the growth of an intolerable cost index that will overwhelm the positive outcomes of the plan and will disrupt the efficiency of the allocation of national resources (17). In a study by Bastany and colleagues who reviewed The Performance Analysis of Teaching Hospitals Affiliated with Shiraz University of Medical Sciences Before and After Health System Reform Plan Using Pabon Lasso Model, they concluded that before the implementation of the health system reform plan in 2013, of the total 14 hospitals, 14% were in zone 1 (poor performance) and 28% of hospitals in zone 3 (good performance). In 2014, after the implementation of the health system reform plan, 21% of the hospitals were in zone 1 and 21% in zone 3 (18). In a study on the Assessment of the Efficiency of Hospitals before and after the Implementation of Health Sector Evolution Plan in Iran Based on Pabon Lasso Model, they concluded that hospital performance showed an increase in mean of bed occupancy and turnover ratio, which changed from 65.40% and 86.22 times/year during 12 months before to 69.97% and 90.98 times/year during 12 months after HSEP, respectively. In line with the Pabon Lasso model, before the implementation of HSEP, 27.27% and 36.36% of the hospitals were entirely efficient and inefficient, respectively, whilst after the implementation of HSEP, their condition changed to 18.18% and 27.27%, in order (19). Therefore, this study aimed to evaluate the performance of teaching hospitals affiliated to Qazvin University of Medical Sciences using Pabon Lasso graph in the 3 years before and 3 years after the implementation of the health reform plan.

## Method

This descriptive, cross-sectional study was carried out on hospitals affiliated to Qazvin University of Medical Sciences (7 public hospitals and 6 private hospitals) which were included in the study. The Takestan Shifa Hospital and the Mehregan Private Hospital were excluded because the criteria for entering the study were one year past from the start of the founding of the hospitals (since 2010).

The data were collected in a six-year period including two three-yearly time frames: before implementation of HRP (2011 and 2013) and after implementation of HRP (2014

and 2016). The selected performance indices included BOR, BTR, and ALS. Data were collected using monthly activity forms approved by the Ministry of Health and Medical Education (MHME). The data were analyzed in SPSS21 and drawing of the Pabon Lasso chart was analyzed.

## Results

In this study, we evaluated in the years before (2011-2013) and after (2014 -2016) the implementation of the health reform plan in public and private hospitals in Qazvin province. The results of evaluating the performance indicators of hospitals in these years showed that the number of active beds in public hospitals was an average of 126 beds, of which Bouali Sina hospital (average 244 beds) was the most and Amiralmoonin in Bouin Zahra Hospital (average of 49 beds) had the smallest number of beds. The lowest percentage of bed occupancy during these years (30.22%) belonged to Amiralmoonin Boyen Zahra Hospital and the highest (75.51%) was related to the 22 Bahman Hospital. The least bed turnover was related to the 22 Bahman Hospital with 18 times a year and the maximum bed turnover of 94 times a year was related to Kosar Hospitals. The highest and the least average length of stay before the implementation of the plan related to the 22 Bahman and Kosar hospitals, respectively. In the years after the implementation of the transformation plan, the average number of beds was 143 active beds, which Bouali Sina Hospital (average of 240 beds) had the highest and Amiralmoonin in Bouin Zahra hospital of Boein Zahra (average of 50 beds) had the least beds.

The least percentage of bed occupancy in the three years after the implementation of the transformation plan (42.61%) belonged to the Amiralmoonin in Bouin Zahra, and the highest (86.13%) was in Bouali Sina Hospital. The Lowest bed turnover after implementation of the plan for the 22 Bahman Hospital(18.22) was 48 times a year, and the maximum bed turnover of 12 times per year related to Kosar Hospital. The highest and least average duration of stay after the implementation of the plan was related to the 22 Bahman and Kosar hospitals respectively. (Table 1)

The results of evaluating the performance indicators of non-academic hospitals in the years before the implementation of the development plan showed that the number of active beds in hospitals was an average of 100 beds, of which Zakariya-e Razi Hospital in Qazvin (an average of 220 beds) was the highest and Valaisr Hospital (average of 46 beds) had the smallest bed numbers. The least percentage of bed occupancy during these years (46.64%) belonged to Rahimian charity Hospital in Alborz and the highest (90.01%) was Tamin Ejtemaei in Takestan. The least bed turnover 61 times a year was Vali asr in Ab-yeek and the highest bed turnover of 185.42 times a year belonged to Deh khoda. The highest and the least average duration of stay before the implementation of the change plan related to Valie Asr and Dehkhoda hospitals respectively.

In the years after the implementation of the development plan in non-academic hospitals, the average number of

beds was 104 active beds, the highest in Zakariya-e Razi Hospital in Ghazvin (average 222 beds) and Valie Asr Hospital (average of 49 beds) was the least.

The lowest percentage of bed occupancy during these years (30.15%) belonged to Rahimian Hospital in Alborz and its highest (78.35%) belonged to Zakariya-e Razi Hospital in Ghazvin. The least bed turnover was about 62 times per year for the Valiasr in Ab-yeek and the maximum bed turnover of 114.59 times per year related to Dehkhoda Hospital. And the highest and least average duration of stay before after the implementation of the change plan was attributed to Tamin Ejtemaei in Takistan and Pasteur hospitals (Table 2).

## Discussion

In the Pabon-Lasso model, three indicators of duration of stay, bed occupancy and bed turnover rates are used simultaneously to evaluate the performance of hospitals. According to the relationship between these three indicators, the simultaneous survey of these indicators can indicate the function of hospitals to use efficiently or inefficiently the existing resources in hospitals (21).

In the present study, three hospitals (43%) were in the efficient zone and two hospitals (29%) were in the ineffective zone but after the implementation of the Health Reform Plan, 1 hospital (14%) was in the zone of efficient and 0 hospitals (0%) in the inefficient zone. Among the 6 private hospitals, 2 hospitals (33%) were in the efficient zone and 2 hospitals (33%) were in the ineffective zone. After the implementation of Health Reform Plan, 2 hospitals (33%) were in the efficient zone and 2 hospitals (33%) in the inefficient zone.

In a study by Bastani and colleagues, the number of hospitals in the efficient zone decreased from 28% to 21% (18). Also, in the assessment of the 5-year performance of hospitals in Kermanshah (22) and the performance of hospitals in Isfahan, after health reform plan (23), the number in the first zone was reduced. Moving public hospitals from the inefficient zone to the other zone and increasing the number of private hospitals in the efficient zone indicates improvements in efficiency and favorable use of resources, and it points out that hospital managers, and policymakers in the university, monitor the performance of hospitals and identified the causes of inefficiencies and the use of interventions and management solutions to enhance the productivity and efficiency of resources in the following years.

In this study, in the years before and after the implementation of health reform plan in public hospitals, respectively (14%) and (28%) and in private hospitals were respectively (16%) and (33%) in the second zone.

In a study by Mottaghi et al, in 6 Kashan hospitals in 2010, 17% and in 2011, 34% were reported (24).

In the study of Alijanzadeh et al. who examined the performance of hospitals in Gilan, 23% of hospitals were in the second zone(25). Also in the study of Nekoeimoghadam



**Table 1: Data on the performance of inpatient wards in the studied hospitals before and after the implementation of Health Sector Evolution Plan**

Row	Hospital name	Active beds		Active day beds		Bed occupancy		Bed turnover		Average length of stay	
		Before	After	Before	After	Before	After	Before	After	Before	After
1	22 Bahman	57	60	20425	21900	76.26	85.58	18.28	18.22	14.58	17.17
2	Amiralmoonin in Bouin Zahra	49	50	17842	18250	30.49	42.6	55.05	95.66	2.22	1.62
3	Bouali Sina	244	402	86963	80830	74.67	86.13	64.11	63.76	4.13	4.55
4	Shahid rajae	149	146	53535	50045	71.95	74.21	77.98	91.92	3.33	2.79
5	Qods	134	143	46971	47935	68.42	84.33	67.71	76.79	3.51	3.68
6	Kosar	143	142	52233	51830	59.13	80.75	94.60	127.5845	2.34	2.30
7	Velayat	106	221	47108	79822	47.09	76.63	39.53	69.48	4.64	3.98
Total		126	143	46440	50087	61.13	75.75	59.61	77.63	4.96	5.15

**Table 2: Data on the performance of inpatient wards in the studied hospitals before and after the implementation of Health Sector Evolution Plan**

	Hospital name	Active beds		Active day beds		Bed occupancy		Bed turnover		Average length of stay	
		Before	After	Before	After	Before	After	Before	After	Before	After
1	Valie Asr	46	49	17648	17529	48.81	46.16	60.61	61.77	3.16	2.67
2	Pasteur	108	106	37230	39209	55.26	44.69	114.70	111.34	1.68	1.47
3	Tamin Ejtmaei in Takistan	99	104	35507	40150	89.37	76.21	118.82	108.65	2.71	2.72
4	Rahimian Charity	59	70	20227	20743	42.14	30.15	78.28	48.67	1.86	1.83
5	Dehkhoda in Qazvin	68	70	24576	30164	71.08	52.82	185.42	114.59	1.48	1.96
6	Zakariya-e Razi	220	222	79729	80862	72.74	78.36	98.2	111.86	2.70	2.55
Total		100	104	35820	38110	63.23	54.73	109.33	92.81	2.3	2.2

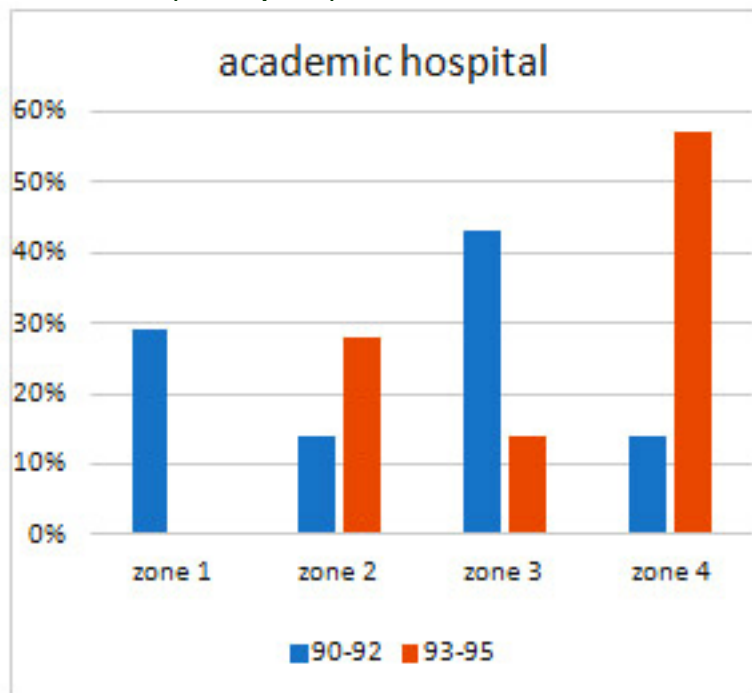
**Table 3: Hospital Performance Indicators According to the Ministry of Health (20)**

Indicator type	Favorable	Average	Unfavorable	Public hospitals		Private hospitals	
				Before	After	Before	After
bed occupancy	More than 70	60-70	Lower than 60	61.13	75.75	63.23	54.73
average length of stay	Lower than 3.5	3.5-4	More than 4	4.96	5.15	2.3	2.2
bed turnover	More than 24	17-24	Lower than 17	59.61	77.63	109.33	92.81

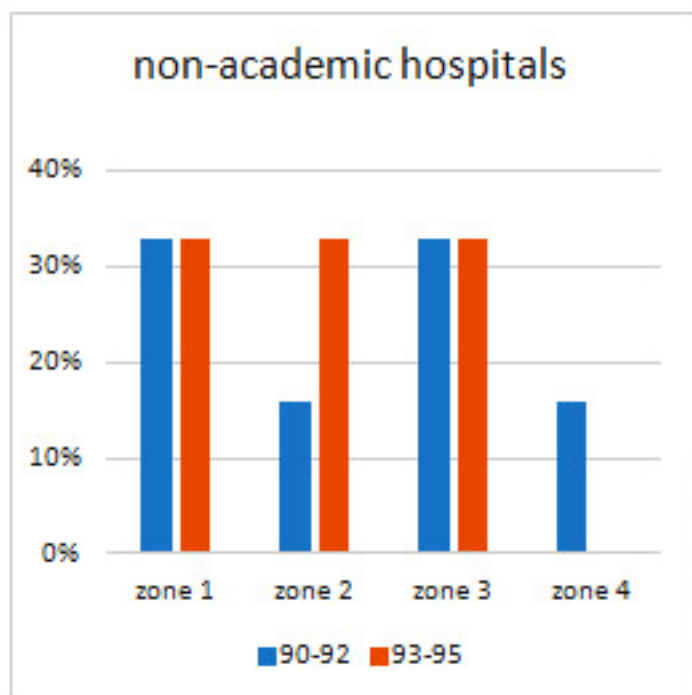
25 percent of hospitals were in the second zone which was similar to this study (26). In the study of Bahadori in Urmia, 4% of the hospitals were in the second zone, which was different from the results of the study (27). The second zone is more specific for large bed turnover hospitals, such as Obstetrics and Gynecology Hospitals and hospitals with a low average length of stay, and if a hospital with these features is in this zone it is indicative of the effectiveness of these centers. Finally, in the years before and after the implementation of health reform plan in public hospitals (14%) and (57%) and in private hospitals were (16%) and (0%) respectively in the fourth zone.

In Bastany's study, 42% of hospitals in 2013 and 35% of hospitals were in the fourth zone in 2014 (18). In a study by Kalhor et al, who studied 21 hospitals in Mashhad in a 4-year time period, they found that 28% of hospitals were located in this area during the study years (28). The fourth zone includes centers that have high bed occupancy rates, low bed turnover, low utilization of facilities and high costs (features of long-term hospitalization centers, such as psychiatric and seniors' centers). By comparing the performance indicators of the present study with similar studies, the reason for these differences can be due to the the implementation of health reform plan because, according to the provisions of this plan, the proportion of direct payments from the pocket of patients has decreased, as demand for services in public hospitals has increased.

**Diagram 1: Relative frequency of hospitals in Qazvin University of Medical Sciences in different areas of performance Pabon Lasso (13 hospitals)**

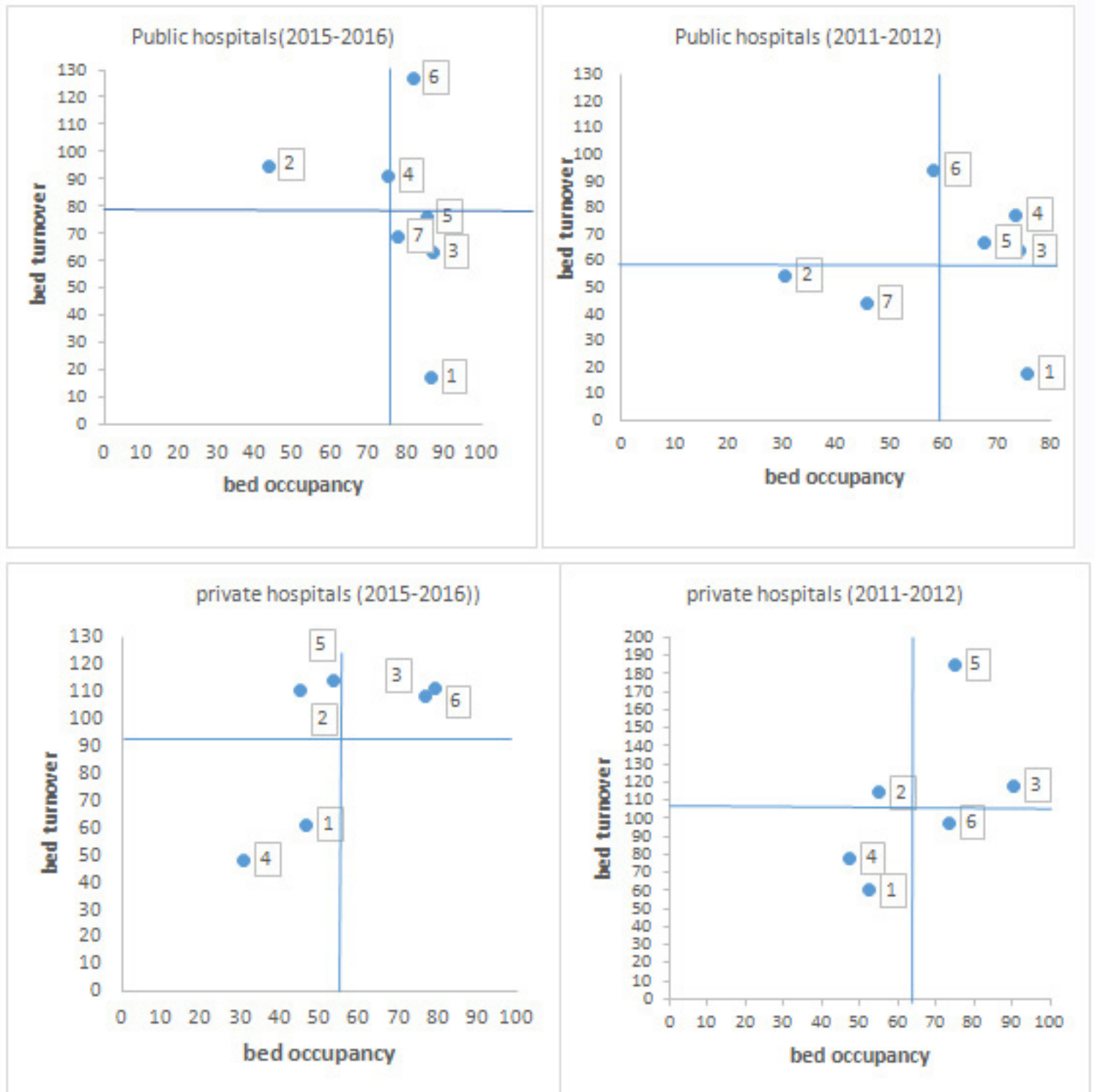


	90-92	93-95
<b>zone 1</b>	29%	0%
<b>zone 2</b>	14%	28%
<b>zone 3</b>	43%	14%
<b>zone 4</b>	14%	57%



	90-92	93-95
<b>zone 1</b>	33%	33%
<b>zone 2</b>	16%	33%
<b>zone 3</b>	33%	33%
<b>zone 4</b>	16%	0%

**Diagram 2: The status of the studied hospitals based on the Pabon Lasso Model before the implementation of Health Reform Plan**



## Conclusion

In general, performance indicators of hospitals affiliated to Qazvin University of Medical Sciences in regard to standards are in a favorable condition. However, with the implementation of the health reform plan and the reduction of the contribution of patients to hospitals affiliated with the Ministry of Health and Medical Education, the increase in the occupancy rate of public hospitals has been a natural occurrence, resulting in an increase in the percentage of flat occupancy and a simultaneous increase in the average. The increase in the average number

of admissions leads to long-term admissions and increases in costs (Chart 4), each of which, in turn, causes problems in hospitals and provides services to patients. Therefore, actions should be taken using appropriate strategies to make optimal and efficient use of resources for proper management.



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