GE-Penetration Rate vs. Various Socio Economic Factors

Executive Summary:

GE uptake has been tremendous in recent years backed by MHLW's pro-generic policies, and we are also confident that GE-penetration will attain the target of 80% (by volume) in next couple of years as well. However, we note that GE-penetration varies significantly among the prefecture (from 73.3% in Okinawa to 51.3% in Tokushima; ~22PP as of December-2015 data, as shown in Annexure 1.).

It is not clear that what factors led to such high discrepancies among prefectures for GE-penetration. It is generally understood that various social-economic factors viz. average income, age –spread, bungyo rate, degree of industrialization and intensity of GE-companies promotional efforts could be attributed such variations.

Encise Research Center (ERC) attempted to take a closer look into relationship between GE-Penetration rate individually with three commonly perceived factors i.e. 1. Per capita income, 2. Rate of 'Bungyo', and 3. Spread in variations of 'age groups' among prefectures.

The study suggests the following 'trends' of GE-penetration ratios verses:

1. **Per Capita Income (PCI):** The findings suggest that, directly or indirectly, lower income may attribute to the higher GE-penetration, and it appears to be the strongest factor among all the three factors we analyzed in this study.
2. **Bungyo-Rate**: we can suggest that there is a positive correlation exists between the Bungyo-rate and GE-penetration rate. This verifies the commonly believed notion that increasing Bungyo rate may lead to increasing GE-penetration.
3. **Various 'Age-groups':** While the finding may look 'ambiguous', it doesn't support generally prevailed understanding that people from higher age group tend to use more GE drugs.

Please read the details in following pages of this report:

IMPORTANT: It must be noted that 'correlation does not imply causation' - correlation studied here for the GE-penetration rate against - PCI, bungyo rate and age groups 'may not necessarily imply' that these factors are related to GE-penetration. The whole purpose of this study is to look into a complex issue to obtain some better clarity over it, and not to arrive some conclusions or suggest any recommendations. Readers must apply their own discretion while making any inferences from the findings of this study.

Devesh Singh, Pharmacist, MBA
Head, Encise Research Center
TEL: +81(0)3-6712-6339
devesh.singh@encise.co.jp

PCI vs GE-Penetration:

The per capita income of 47 Japanese prefectures falls between a wide range of 383K JPY/month to 235.6K JPY/moth. On other hand the GE penetration rate also significantly vary among prefectures (Table 1). It is also evident that GE-Penetration is gradually increasing all over the Japan.

ERC takes a close look if there is any trend suggesting relationship. At first instance it doesn't appear to have a meaningful correlation; however a closer looks suggest that the relationship is deeper than generally expected and is growing:

1. A negative Correlation undoubtedly exists between PCI and GE-Pnt ratio among prefectures and this correlation is continuously growing YoY – in less than past three years (as 2015 data available until Dec 2015only) – it grew from -0.59 to -0.7 for select 37 prefectures and can be considered as moderate-to-strong negative correlation. While for all 47 and select 42 prefectures similar correlations are found with mind-to moderate nature (Chart 1 and Chart 2).

2. The data suggests that lower income may attribute to the higher GE-penetration, and it appears to be the strongest factor among the three attributes we analyzed in this study.
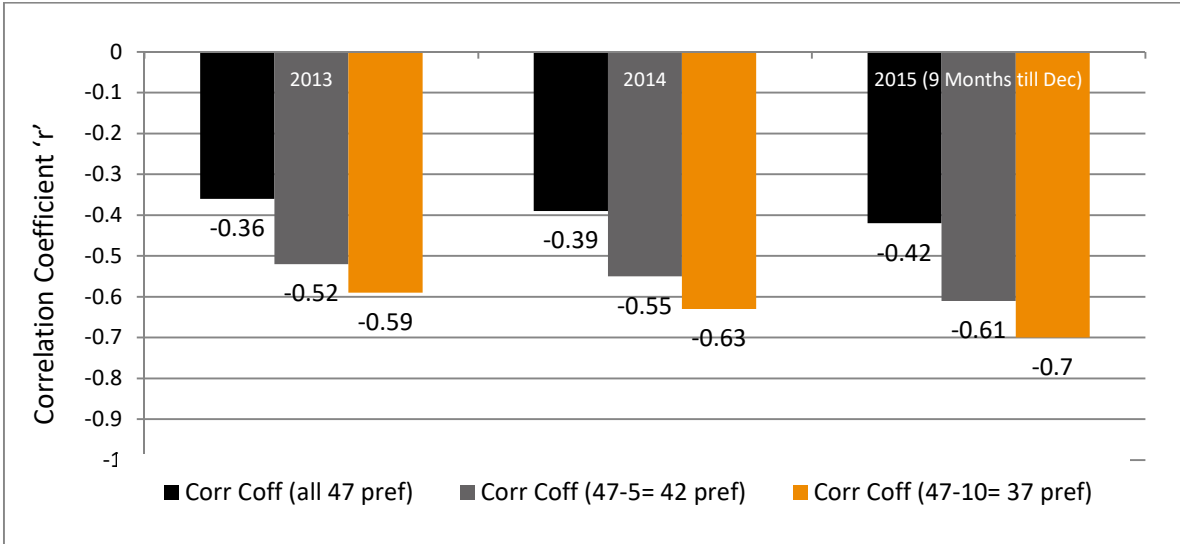
Table 1
Monthly PCI and GE Penetration: Data Spread

|	High	Low	Range (PP)
PCI ¥ '000 (Month)	383	235.6	147.4
GE-Pent 2014 (%)	63.9	39.6	24.3
GE-Pent 2015 (%)	70.3	46.8	23.5
GE-Pent 2016* (%)	73.3	51.3	22

*for 9 months until December 2015
Source: MHLW

Chart 1
Correlation between PCI vs. GE Penetration

Note: Monthly Per Capita Income (PCI) for 2015 as per MHLW is compared against GE-penetration for the three years.
Source: MHLW, Encise Research Center

Chart 2
Correlation between PCI vs. GE Penetration in 2015*
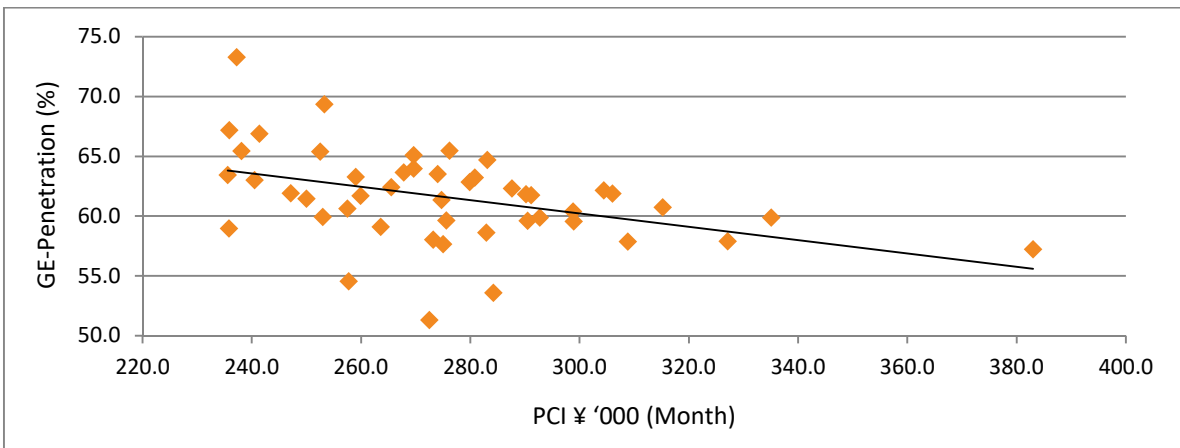
Source: MHLW

Bungyo vs. GE-Penetration:

Bungyo (separation of 'medical practice' from 'dispensing' by GPs) has believed to contributed significantly in increasing GE-penetration in past. Bungyo rate was ~50% during 2003 (i.e. ~50% of GP used to practice 'dispensing' simultaneously with prating), which reached 70% in 2015 (i.e. only 30% of GP dispense now). GP practicing 'dispensing' are believed to be 'not so GE-friendly' traditionally and may have played a bottleneck role in GE-uptake.

ERC analyzed prefecture wise Bungyo rate in 2015 and 2014 vs the GE-Penetration rate for the corresponding period.

- There is a wide difference for both the Bungyo rate and GE-penetration rate among the prefectures (Table 2)

- A weak positive correlation (of r = 0.20) observed when all 47 prefectures are analyzed. However we see the correlation strengthening meaningfully for select 42 and 37 prefectures respectively (to r = 0.43 and r = 0.55 respectively). We also note that correlation between Bungya-rate and GE-penetration is reducing slightly year over year for all the categories (Chart 3, and Chart 4).

- With these findings we can suggests that there is a positive correlation exist between the Bungyo-rate and GE-penetration rate. This verifies the commonly believed notion that increasing Bungyo rate may lead to increasing GE-penetration.

- We cannot completely explain why the correlation is decreasing year-over-year for all the groups. One possibility could be that as Bungyo is approaching its optimal stage, its effect on increasing GE-penetration is no more effective (it is expected that Bungyo may reach around 80% in the best case scenario). However, to comment further, we need to analyze past few years Bungyo rates with corresponding GE-penetration rates.

Table 2
Bungyo Rate in Prefectures – Key Statistics

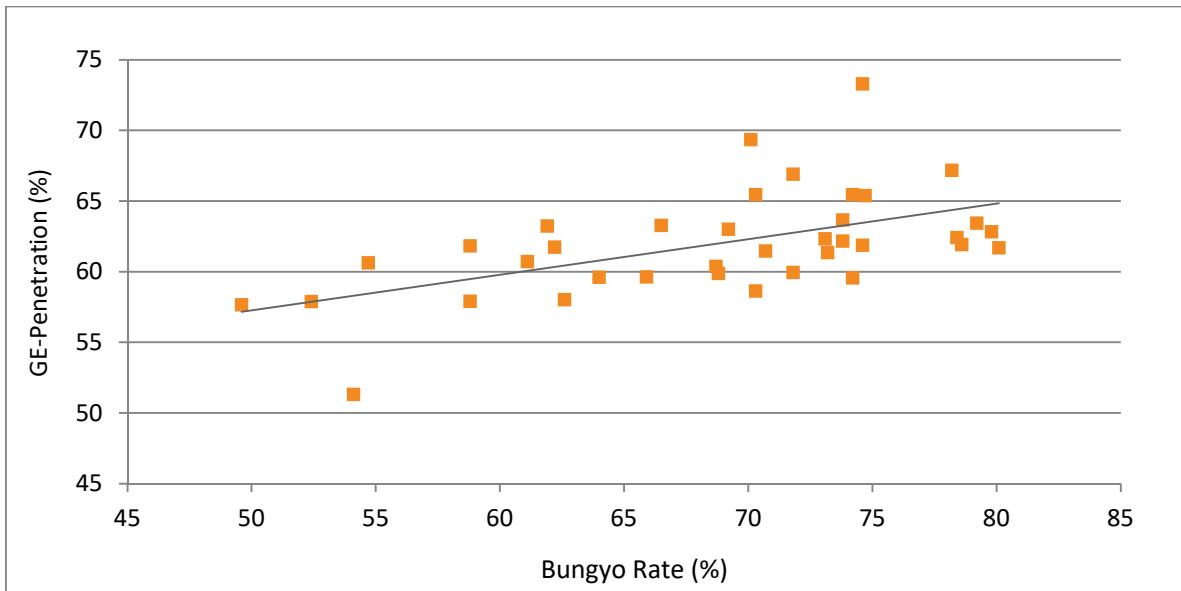|	High	Low	Range (PP)	Japan Average
Range Bungyo 2015	84.6	47.2	37.4	70
Range Bungyo 2014	84.2	45	39.2	68.7
YoY Change (PP)	0.4	2.2		

Source: MHLW, Encise Research Center

Chart 3
Bungyo Rate vs. GE Penetration
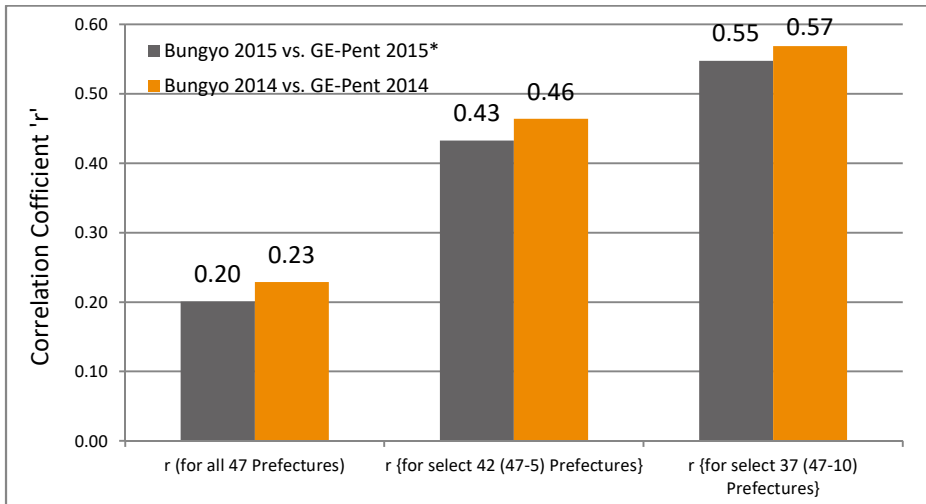
*GE –Penetration for 2015 is for 9 months ending Dec 2015.
Source: MHLW, Encise Research Center

Chart 4
Bungyo Rate vs. GE-Penetration Correlation for Select 37 Prefectures (2015*)

*GE –Penetration for 2015 is for 9 months ending Dec 2015.
Source: MHLW, Encise Research Center

Population Spread vs. GE-Penetration

Due to difference in co-payment ratio with respect to different age categories (Annexure 2), we looked closely into these age-categories' distribution in different prefectures and analyze the situation with respect to GE-penetration rates in the respective prefectures. Basically to test the following commonly perceived assumptions:

1. Higher co-pay should lead to higher GE-consumption due to direct financial burden on patients.
2. Elderly people have lesser income and they use more medicines. Due to this, higher elderly populations should lead to higher GE-use despite relatively lower co-pay.
3. The children of age group 0-6 years are generally fully covered by various government schemes (effective co-pay ~0%), hence likelihood of using GE is minimal in this age-group.

Data Description: The total population of Japan as of Jan 2016 was ~128.066 million with an overall man to women ratio of (49:51). However, the spread varies within prefectures for different age categories and sex ratio (Annexure 3 and Annexure 4).

Findings: The findings from 'age categories' spread vs. GE-penetration among various prefectures gives littlie 'ambiguous' results. While low correlations could be observed, it indicates a positive correlation of GE-penetration ratios vs population of 0-4 years of age and indicates a negative correlation vs. elderly population (Chart 1.). I.e. it suggests that prefectures with high children ratio have high GE-penetration and prefectures with high elderly population have low GE penetration – this is just opposite to commonly perceived understating. The possible reasons could be: -

1. Unlike in case of Bungyo rate and PCI – the spread of data is not wide enough in case of age group as percentage of population. This limits the scope of finding correlation and arrive some statistical extrapolation or inference.
2. The age-group 0-4, as a % to total population is very low and hence not comparable with other larger groups on same scale.

However, looking at the data we think that the prominence (which actually as we said doesn't exist as such) of any age-group doesn't lead to or influence GE-penetration.
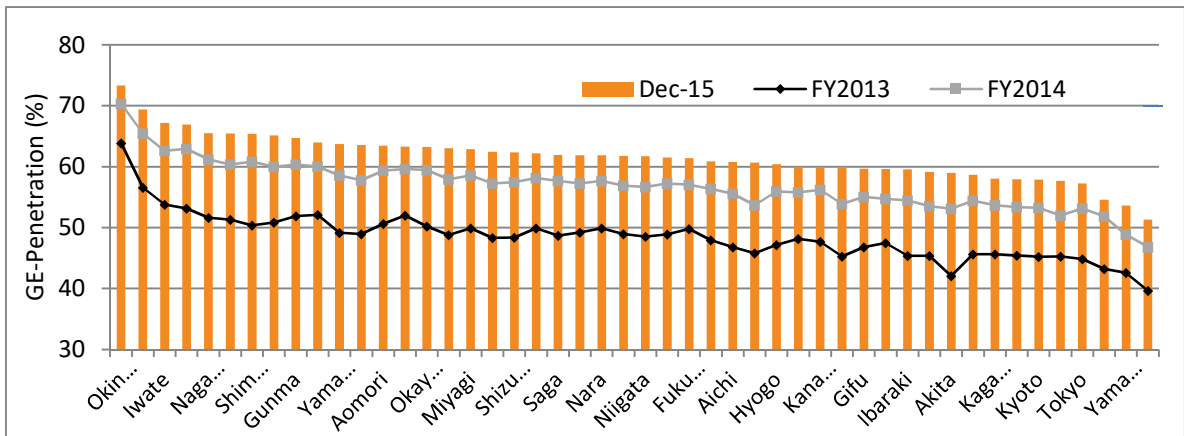
This 'notion' alone could be considered as key finding from this set as it is generally prevailed understanding that people from higher age group tend to use more GE drugs. Which doesn't appear to be the case.

Chart 1.
Ambiguity of Age Group Vs. GE-Penetration
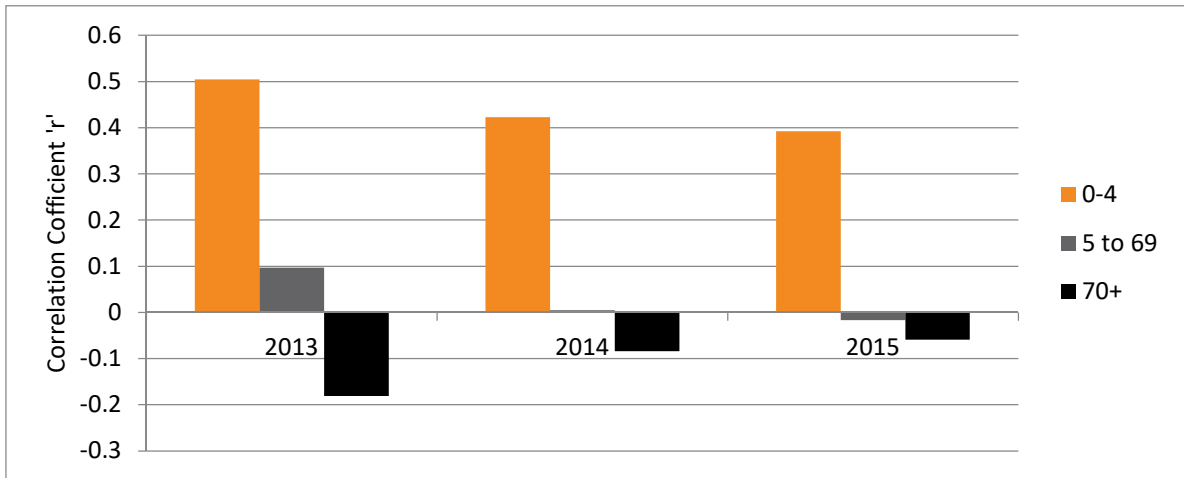
Source: MHLW, Encise Inc.

Annexure 1
GE-Penetration Ration in Prefectures

Source: MHLW

Annexure 2.
Co-Pay for Age-Categories

Age Group (Years)	Co-Pay Ratio	Note
0-6	20%*	
6-69	30%	We take the closet data available i.e. 5 to 69 years of age
70-74	20%**	We take all 70+ of age as one group for analysis
>75	10%	

* Actually 0% because in most cases municipality bears the cost.
**For those who are already 70 years old on April 1st, 2014, Co-payment rate is fixed on 10%. It's because before April 1st, 2014, co-payment rate for >70 years old is 10%.
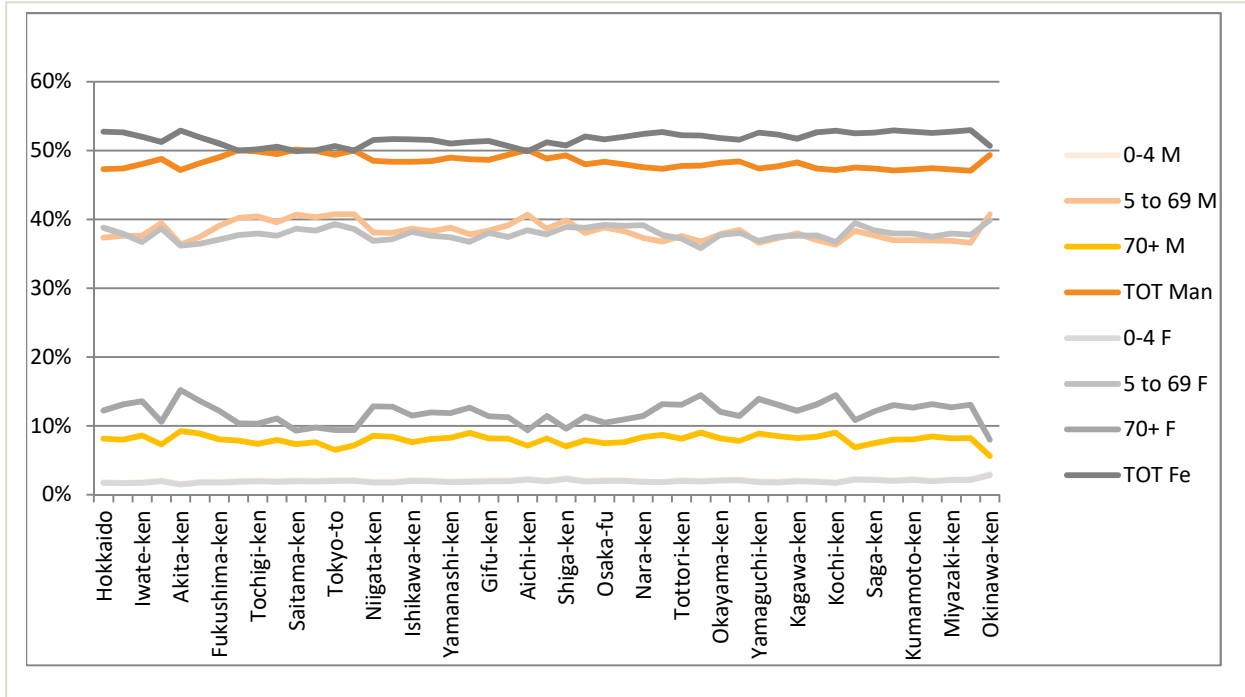Source: MHLW

Annexure 3
Distribution of Age/Sex Categories in Prefectures
(As % of total Population in Jan-2016)

Age Group	Age Group	Low	High	Range
0 – 4	Male	1.5	3.0	1.4
	Female	1.5	2.9	1.4
	Total	3.0	5.8	2.8
5 to 69	Male	36.3	40.7	4.4
	Female	35.8	39.3	3.5
	Total	72.5	80.5	8.0
70+	Male	5.6	9.3	3.6
	Female	8.0	15.2	7.2
	Total	13.6	24.4	10.8
Total	TOT Male	47.6	50.1	2.5
	TOT Female	49.9	52.9	3.1

Source: MHLW, Encise Inc.

Annexure 4
Distribution of Age/Sex Categories in Prefectures
(As % of total Population in Jan-2016)

Source: MHLW, Encise Inc.