Group 4

Assignment 2

Insurance Market Data & Analytics

November 13, 2019

Introduction

In this report, we are going to explore the insurance companies in different nine states. Due to the dataset of the young insurers are non-accessible, this data analytics is mainly focuses on those who enroll for Medicare Advantage Plans (Part C) which Medicare delegates all insurance services of the 65+ US citizens who want to do Part C to another commercial private insurance company. Our group is going to play as a consulting company that helps congress to understand the insurance companies and their performances better.

Finding a partner for a "private single-payer" proposal

In this section, we are going to find the best insurance company candidate to partner with in each state, if in the future those states want to move to a private single payer model. Here, we assume that the insurance company which has the highest market share (measured as the ratio of the sum of enrollments in each company divided by the sum of enrollments in each state) is the best candidate, and those states with high HHI index (measured as the sum of all the squared value of market share of each insurance company in the state) have the trends to find a partner for a "private single-payer".

Based on our assumption, we import and filter the data we needed from the website of the Centers for Medicare & Medicaid Services. We need to import three datasets to work on this question: "CPSC_Enrollment", "Monthly_Report" and "MajorInsuranceOrgs". To get the value of market share of each company, we have to get the sum of enrollments in each company and the sum of enrollments in each state first. So, we merged the filtered dataset to one table first.

In the beginning, we must merge two datasets *"Monthly_Report"* and "*MajorInsuranceOrgs"* by using *"Organization Marketing Name"* as connection. By doing so, we can check the real parent organization that is behind many of these smaller entities by checking *"Contract Number".* To make the data more understandable, we select the columns, *"Contract Number"* and *"Mother Company",* by using function *data.frame()* to make it more convenient for us to compare the companies corresponding to each contract. *(Table 1)*

	Contract Number	Mother Company
1	H1723	Absolute Total Care
2	H5337	Aetna Health Inc.
3	H7172	Aetna Health Inc.
4	H1610	Aetna Health Inc.
5	H8026	Aetna Health Inc.
6	H2506	Aetna Health Inc.
7	H5521	Aetna Health Inc.
8	H5521	Aetna Health Inc.
9	H5521	Aetna Health Inc.
10	H5325	Aetna Health Inc.
11	H3931	Aetna Health Inc.
12	H5521	Aetna Health Inc.
13	H5521	Aetna Health Inc.
14	H5521	Aetna Health Inc.
15	H1608	Aetna Health Inc.
16	H5325	Aetna Health Inc.

Table 1

	Contract Number	Mother Company
1	H1723	Absolute Total Care
2	H5337	Aetna Health Inc.
3	H7172	Aetna Health Inc.
4	H1610	Aetna Health Inc.
5	H8026	Aetna Health Inc.
6	H2506	Aetna Health Inc.
7	H5521	Aetna Health Inc.
10	H5325	Aetna Health Inc.
11	H3931	Aetna Health Inc.
15	H1608	Aetna Health Inc.
19	H1109	Aetna Health Inc.
23	H1609	Aetna Health Inc.
32	H4523	Aetna Health Inc.
37	H9431	Aetna Health Inc.
43	H2663	Aetna Health Inc.
85	H7301	Aetna Health Inc.

Table 2

Now, as shown in *Table 1*, we get a combination of *"Contract Number"* and *"Mother Company"*. However, as we can see from *Table 1*, there are many duplicate rows. As a result, we use *unique()* function to delete those duplicate rows and we will get the result shown in Table 2 (The data frame is called *"uni_merge"*).

After we get the above data frame we need for future use, let's back to our main task: Knowing each "Contract Number" in *"CPSC_Enrollment"* is belonged to which big guy. Therefore, we have to merge the data *"CPSC_Enrollment" and* "uni_merge" using *"Contract Number"* as link.

	Contract Number	Mother Company	Plan ID	SSA State County Code	FIPS State County Code	State	County	Enrollment
1	H0022	Buckeye Health Plan - MyCare Ohio	1	23570	26115	MI	Monroe	12
2	H0028	Humana	24	29010	32003	NV	Clark	31
3	H0028	Humana	27	29010	32003	NV	Clark	13
4	H0088	WellCare	1	33420	36061	NY	New York	161
5	H0104	BlueCrossBlueShield	806	44320	47065	TN	Hamilton	11
6	H0192	AmeriHealth Caritas VIP Care Plus	1	23490	26099	MI	Macomb	664
7	H0192	AmeriHealth Caritas VIP Care Plus	1	23620	26125	MI	Oakland	55
8	H0192	AmeriHealth Caritas VIP Care Plus	1	23810	26163	MI	Wayne	2305
9	H0251	UnitedHealthcare	2	44760	47153	TN	Sequatchie	185
10	H0251	UnitedHealthcare	2	44210	47043	TN	Dickson	365

Table 3

After we get the data shown in Table 3, we have to arrange the data to get a clearer shape on how many *"Enrollment"* does each "Mother Company" have. As a result, we count the numbers of *"Enrollment"* in each *"Mother Company"*, group by *"State"* and *"Mother Company",* and order in descend order. *(Table 4)*

	State	Mother Company	Enrollment
1	DE	Aetna Health Inc.	15746
2	DE	UnitedHealthcare	6770
3	DE	Humana	6679
4	DE	Cigna	3815
5	DE	Saint Francis LIFE	253
6	DE	BlueCrossBlueShield	88
7	DE	Personal Choice 65 PPO	15
8	ID	BlueCrossBlueShield	39550
9	ID	UnitedHealthcare	30139
10	ID	PacificSource Medicare	15850
11	ID	SelectHealth	15246
12	ID	Humana	7067
13	ID	Aetna Health Inc.	1012

Table 4

To calculate the market share, we still have to know the total enrollment in each state. Therefore, we sum up the numbers of *"Enrollment"* in each *"State"*.

	State	Enrollment
1	DE	33366
2	ID	108864
3	MI	868548
4	MN	417977
5	NV	199415
6	NY	1521898
7	OK	157248
8	TN	521159
9	WY	3184

Table 5

As we know the total enrollment of each state and each company, we can calculate the market share of each company in each state. We separate this process into three steps. First, we have to merge *'Table 4'* and *'Table 5'* to get *'Table 6'*.

	State	Mother Company	Enrollment.x	Enrollment.y
1	DE	Aetna Health Inc.	15746	33366
2	DE	UnitedHealthcare	6770	33366
3	DE	Humana	6679	33366
4	DE	Cigna	3815	33366
5	DE	Saint Francis LIFE	253	33366
6	DE	BlueCrossBlueShield	88	33366
7	DE	Personal Choice 65 PPO	15	33366
8	ID	BlueCrossBlueShield	39550	108864
9	ID	UnitedHealthcare	30139	108864
10	ID	PacificSource Medicare	15850	108864
11	ID	SelectHealth	15246	108864
12	ID	Humana	7067	108864
13	ID	Aetna Health Inc.	1012	108864

Table 6

Next, we get the market share of each company in each state by dividing *"Enrollment.x"* by *"Enrollment.y"*. Last, we use round() function to round to four decimal places. The result we get shown below. *(Table 7)*

	State	Major.Company	sum_enroll_major_group	sum_enroll_state	Market.Share
1	DE	Aetna Health Inc.	15746	33366	0.4719
2	DE	BlueCrossBlueShield	88	33366	0.0026
3	DE	Cigna	3815	33366	0.1143
4	DE	Humana	6679	33366	0.2002
5	DE	Personal Choice 65 PPO	15	33366	0.0004
6	DE	Saint Francis LIFE	253	33366	0.0076
7	DE	UnitedHealthcare	6770	33366	0.2029
8	ID	Aetna Health Inc.	1012	108864	0.0093
9	ID	BlueCrossBlueShield	39550	108864	0.3633
10	ID	Humana	7067	108864	0.0649
11	ID	PacificSource Medicare	15850	108864	0.1456
12	ID	SelectHealth	15246	108864	0.1400

Showing 1 to 13 of 126 entries, 5 total columns

Table 7

Our next mission is to get the Herfindahl-Hirschman Index (HHI) to measure each state's concentration of market power. The formula of HHI is the sum of the squares of market share. Therefore, we calculate the HHI of each state and arrange in descending order. The result is shown below. *(Table 8)*.

	State	HHI
9	WY	0.4877697
8	MI	0.3200403
7	DE	0.3170672
6	NV	0.2807429
5	ID	0.2537584
4	MN	0.2458557
3	TN	0.2411919
2	OK	0.2301163
1	NY	0.1217038

Table 8

From the table above, we can tell that four states which possess the top four high HHI ratio are Wyoming (WY), Michigan (MI), Delaware (DE), and Nevada (NV). So, these four states are qualified for the assumed states with high HHI ratio. Therefore, we focus on these four states to continue the following research about the perfect candidates of each state, and the outcomes are shown as below. *(Table 9)*

	State	Major.Company	Market.Share
1	DE	Aetna Health Inc.	0.4719
2	MI	BlueCrossBlueShield	0.5200
3	NV	UnitedHealthcare	0.4031
4	WY	UnitedHealthcare	0.6564

Table 9

As a result, the best insurance company candidate to partner with in the state of Wyoming is UnitedHealthcare (with 0.66 market share), and that in the state of Michigan is Blue Cross Blue Shield (with 0.52 market share), and that in the state of Delaware is Aetna Health Inc. (with 0.47 market share), and that in the state of Nevada is also UnitedHealthcare (with 0.66 market share).

Examine the Insurance Benefit Package

We first use read.delim() to import data from 'pbp_b16_dental.txt' into R, however, the variables' names are messy, and so we read 'PBP_Benefits_2020_dictionary.xlsx' into R and try learning variables in the dataset corresponding to "Preventive Dental Items as a supplemental benefit under Part C" and "Comprehensive Dental Items as a supplemental benefit under Part C". We find out that "pbp_b16a_bendesc_yn" represents preventive dental items and "pbp_b16b_bendesc_yn" comprehensive dental items. Moreover, we find out that "pbp_a_hnumber", "pbp_a_plan_identifier" and "segment_id" will be useful when we map pbp_b16_dental.txt to contract/plan dataset.

We extract five variables mentioned above into a new table, arrange the table in a way that different plans in one contract cluster and only one segment is counted for each plan. The pbp_b16_dental database reports the benefits by Contract/Plan/Segment while the enrollment file

reports by Contract/Plan and does not have the details of enrollment by Segment. So when we look into the benefit database, we assume that the first Segment dental benefit applies to the entire Plan. Now we have a well-structured contract/plan table that contains information about preventive/comprehensive dental items.

```
pbp_b16_dental_new1 <- pbp_b16_dental1[,c("pbp_a_hnumber","pbp_a_plan_identifier","segment_id","pbp_b16a_bendesc_yn","pbp_b16b_bendesc_yn")]
View(pbp_b16_dental_new1)

pbp_b16_dental_new_row1 <- pbp_b16_dental_new1 %>%
  group_by(pbp_a_hnumber,pbp_a_plan_identifier) %>%
  arrange(pbp_a_hnumber, pbp_a_plan_identifier, segment_id) %>%
  mutate(row = row_number()) %>%
  filter(row <= 1)
View(pbp_b16_dental_new_row1)

pbp_b16_dental_new1 <- pbp_b16_dental_new_row1
```

Next, we merge this table with the merge_contract _new table we have created for question 1. The latter table matches specific contract/plan with enrollment number in one particular county and with the contract's highest-level parent company as well based on same contract number and same plan id.

Since plan id formats are slightly different in two tables, we convert plan ids in both tables to factors so that they have the same format and then we merge the two tables.

Now we have a table with preventive/comprehensive dental items related contract/plans and their enrollment number in one particular county and their parent company, and name it merge_contract_plan.

```
pbp_b16_dental_new1$pbp_a_plan_identifier <- as.factor(pbp_b16_dental_new$pbp_a_plan_identifier)
View(pbp_b16_dental_new1)
merge_contract_new$Plan.ID <- as.factor(merge_contract_new$Plan.ID)
View(merge_contract_new)
merge_contract_plan <- merge(merge_contract_new, pbp_b16_dental_new, by.x = c("Contract.Number","Plan.ID"), by.y =
                               c("pbp_a_hnumber","pbp_a_plan_identifier"))
View(merge_contract_plan)
```

After that, per request of question 2, we select top 5 insurance companies (highest level parent companies) in terms of market share in each my team's state from the market share table we create for question 1.

```
#select top-5 company
merge_state_company_top5 <- merge_state_company%>%
  group_by(State) %>%
  mutate(row = row_number()) %>%
  filter(row <=5 )
View(merge_state_company_top5)
```

Then we merge the top 5 insurance companies table with merge_contract_plan table by state and the names of the top 5 insurance companies. As a result, we create a table for contracts/plans with dental packages from top 5 insurance companies only and store the table by the name merge_contract_plan_top_5. Then we have the table to work on the sub-questions in question 2 directly.

Now we have the table to work on the sub-questions in question 2 directly. To answer question a, What percentages of the enrollees enjoy the "Preventive Dental Items as a supplemental benefit under Part C," we first filter out row with pbp_b16a_bendesc_yn = 1 in merge_contract_plan_top5 table, since we know enrollment is denoted by setting that variable to 1 and non-enrollment is denoted by setting that variable to 2. Then we get the number of enrollment in contracts with preventive dental items as a supplemental benefit under Part C for a major company in a state by summing up number of beneficiaries subscribing different contracts from the same major company in a state. We get the number of enrollment for a major company in a state without any restrictions then, and calculate the percentage. The table for percentage is attached in result_table 1.

States' names are presented in the first column, and top 5 insurance brands within a state are presented in the second column. Sum_pre_dental indicates enrollment in contracts provided by a top 5 insurance company with preventive dental items, while sum_total is number of enrollment in contracts provided by a top 5 insurance company without restrictions. The last column in the table records enrollment in contracts with preventive dental items as a percentage of all enrollment.

As shown in the table, there is only one big name insurance company in Wyoming, which provides contracts with preventive dental items as a supplemental benefit under part C, whereas all other states have at least four big name companies providing the package. Meanwhile, Humana stands out as an insurance company that provides substantial coverage on preventive dental items. In all our teams' states except Wyoming, usually more than 90% of its beneficiaries receive coverage on preventive dental items under part C. Whereas, coverage rates of other big name companies range from 40% to 90%; in fact, coverage rate on preventive dental items of the rest of the team on average is around 50%, which looks pale compared to Humana. So Humana

can be a potential partner for the committee from Congress to work on providing preventive dental items under part C in our team's states.

```
Pre_Dental <- merge_contract_plan_top5 %>% filter(pbp_b16a_bendesc_yn==1) %>% group_by(State,MajorInsuranceOrgName) %>%
  summarise(sum_pre_dental = sum(Enrollment))
View(Pre_Dental)
Total <- merge_contract_plan_top5 %>% group_by(State,MajorInsuranceOrgName) %>% summarise(sum_total = sum(Enrollment))
View(Total)
merge_pre_dental <- merge(Pre_Dental, Total, by = c("State","MajorInsuranceOrgName"))
merge_pre_dental$percentages_of_preventive_dental <- round(merge_pre_dental$sum_pre_dental/merge_pre_dental$sum_total,4)
merge_pre_dental <- merge_pre_dental %>% arrange(State, -percentages_of_preventive_dental)
View(merge_pre_dental)
```

To answer question b, What percentages of the enrollees enjoy the "Comprehensive Dental Items as a supplemental benefit under Part C," we replicate the work in part a, however, this time we set pbp_b16b_bendesc_yn=1. The result is attached in result_table 2. The table looks similar to table 1, except the sum_pre_dental being changed to sum_com_dental to record number of beneficiaries in a contract with comprehensive dental items and the percentage column reflects this number as a percentage of total enrollment number.

Humana still stands out as the unicorn to have substantial coverage on comprehensive dental items in a number of states, especially in the mid-west region. However, Cigna in Delaware, SelectHealth in Idaho and Ucare's MSHO have 100% coverage on comprehensive and preventive dental items for their subscribers, so if the Congress committee considers to work on providing dental items in these states, they should go to the three brands mentioned above.

```
Com_Dental <- merge_contract_plan_top5 %>% filter(pbp_b16b_bendesc_yn==1) %>%
  group_by(State,MajorInsuranceOrgName) %>% summarise(sum_com_dental = sum(Enrollment))
View(Com_Dental)
merge_com_dental <- merge(Com_Dental, Total, by = c("State","MajorInsuranceOrgName"))
merge_com_dental$percentages_of_comprehensive_dental <- round(merge_com_dental$sum_com_dental/merge_com_dental$sum_total,4)
merge_com_dental <- merge_com_dental %>% arrange(State, -percentages_of_comprehensive_dental)
View(merge_com_dental)
```

Result_table 1:

	State	MajorInsuranceOrgName	sum_pre_dental	sum_total	percentages_of_preventive_dental
1	DE	Cigna	3551	3551	1
2	DE	Humana	6226	6679	0.9322
3	DE	UnitedHealthcare	3169	6770	0.4681

4	DE	Aetna Health Inc.	6658	15746	0.4228
5	ID	SelectHealth	14971	14971	1
6	ID	Humana	6968	7067	0.986
7	ID	UnitedHealthcare	27787	30139	0.922
8	ID	BlueCrossBlueShield	29428	58581	0.5023
9	MI	Priority Health Medicare	271230	292123	0.9285
10	MI	Humana	69690	86814	0.8028
11	MI	BlueCrossBlueShield	673074	982836	0.6848
12	MI	Aetna Health Inc.	16877	30184	0.5591
13	MI	HAP Senior Plus	31320	60587	0.5169
14	MN	UCare's MSHO	13395	13395	1
15	MN	Humana	121506	129992	0.9347
16	MN	UCare	205045	234224	0.8754
17	MN	BlueCrossBlueShield	171822	218750	0.7855
18	MN	HealthPartners	10529	27194	0.3872
19	NV	Humana	61540	62178	0.9897
20	NV	UnitedHealthcare	70509	80389	0.8771
21	NV	Aetna Health Inc.	12004	14697	0.8168
22	NV	BlueCrossBlueShield	5115	12206	0.4191
23	NV	Senior Care Plus	7098	16979	0.418
24	NY	Healthfirst Medicare Plan	158609	170183	0.932
25	NY	Excellus Health Plan, Inc	116017	141764	0.8184
26	NY	UnitedHealthcare	291271	383786	0.7589
27	NY	Aetna Health Inc.	78761	162363	0.4851
28	NY	BlueCrossBlueShield	73644	176000	0.4184
29	OK	Humana	39888	42493	0.9387

30	OK	CommunityCare Senior Health Plan (HMO)	22072	24057	0.9175
31	OK	UnitedHealthcare	43512	51141	0.8508
32	OK	GlobalHealth	10116	12119	0.8347
33	OK	Aetna Health Inc.	15509	22191	0.6989
34	TN	Cigna	122106	123472	0.9889
35	TN	Humana	285314	291373	0.9792
36	TN	BlueCrossBlueShield	145328	152508	0.9529
37	TN	UnitedHealthcare	115862	127179	0.911
38	TN	Aetna Health Inc.	5943	14805	0.4014
39	WY	Aetna Health Inc.	234	714	0.3277

Result_table 2:

	State	**MajorInsuranceOrgName**	**sum_pre_dental**	**sum_total**	**percentages_of_preventive_dental**
1	DE	Cigna	3551	3551	1
2	DE	Humana	6226	6679	0.9322
3	DE	UnitedHealthcare	3169	6770	0.4681
4	DE	Aetna Health Inc.	6658	15746	0.4228
5	ID	SelectHealth	14971	14971	1
6	ID	Humana	6968	7067	0.986
7	ID	UnitedHealthcare	27787	30139	0.922
8	ID	BlueCrossBlueShield	29428	58581	0.5023
9	MI	Priority Health Medicare	271230	292123	0.9285
10	MI	Humana	69690	86814	0.8028
11	MI	BlueCrossBlueShield	673074	982836	0.6848
12	MI	Aetna Health Inc.	16877	30184	0.5591

13	MI	HAP Senior Plus	31320	60587	0.5169
14	MN	UCare's MSHO	13395	13395	1
15	MN	Humana	121506	129992	0.9347
16	MN	UCare	205045	234224	0.8754
17	MN	BlueCrossBlueShield	171822	218750	0.7855
18	MN	HealthPartners	10529	27194	0.3872
19	NV	Humana	61540	62178	0.9897
20	NV	UnitedHealthcare	70509	80389	0.8771
21	NV	Aetna Health Inc.	12004	14697	0.8168
22	NV	BlueCrossBlueShield	5115	12206	0.4191
23	NV	Senior Care Plus	7098	16979	0.418
24	NY	Healthfirst Medicare Plan	158609	170183	0.932
25	NY	Excellus Health Plan, Inc	116017	141764	0.8184
26	NY	UnitedHealthcare	291271	383786	0.7589
27	NY	Aetna Health Inc.	78761	162363	0.4851
28	NY	BlueCrossBlueShield	73644	176000	0.4184
29	OK	Humana	39888	42493	0.9387
30	OK	CommunityCare Senior Health Plan (HMO)	22072	24057	0.9175
31	OK	UnitedHealthcare	43512	51141	0.8508
32	OK	GlobalHealth	10116	12119	0.8347
33	OK	Aetna Health Inc.	15509	22191	0.6989
34	TN	Cigna	122106	123472	0.9889
35	TN	Humana	285314	291373	0.9792
36	TN	BlueCrossBlueShield	145328	152508	0.9529
37	TN	UnitedHealthcare	115862	127179	0.911
38	TN	Aetna Health Inc.	5943	14805	0.4014

39	WY	Aetna Health Inc.	234	714	0.3277

Quality of care and performance of the plans

In this section, we are going to explore the quality of care provided by the major insurance companies per state. The "performance" of the insurance companies is measured by how well the companies monitored their members to avoid drug addiction caused by an unsafe dose of prescription opioids. In the states that assigned to our group, we extract the top ten companies that hold the largest market share in that state. Most of the states in our group have less than ten insurance companies for total, therefore, all the company's performances of these states are included in our analysis.

According to the previous analysis, we have got the insurance company, the contracts of the companies, as well as the total enrollment number of the assigned states. Then, the data of prescription opioids reported in sheet EOC 170 is extracted, it represents the use of opioids at high dosage (UOD) of each contract. After cleaning the dataset, we are going to manipulate the data of each state separately. Since the performance is the UOD rate of an insurance company in each state, we analyze it by the weighted average of the UOD rate based on the enrollment number of each company. The varying degrees of importance of the numbers are taken into account that each of them is making up a different percentage of the total. For example, the average UOD rate of New York State is calculated by the sum of multiplication of the UOD rate of each Contract by the enrollment number of contracts in the New York States, then divide them by the total enrollment of the insurance company. Afterward, the results should be combined with the table that shows the insurance companies with the top-ten market shares in order to get the ordered DOB rate of these ten companies in the New York States. The process above is repeated state by state so that we could get the result and analyze them based on each state. The results are shown in the tables below.

	New York State				
MajorInsuranceOrgName	uod_company	State	sum_state	sumstate_company	market_share
BlueCrossBlueShield	400.81	NY	1521898	127784	0.084
UnitedHealthcare	368.13	NY	1521898	383786	0.2522
Aetna Health Inc.	143.06	NY	1521898	167647	0.1102
EmblemHealth Medicare HMO	133.81	NY	1521898	119702	0.0787
Humana	124.35	NY	1521898	51532	0.0339
Fidelis Legacy Plan	105.74	NY	1521898	49511	0.0325
MVP HEALTH CARE	103.1	NY	1521898	59653	0.0392
Excellus Health Plan, Inc	102.65	NY	1521898	153452	0.1008
Independent Health	98.14	NY	1521898	66106	0.0434
WellCare	91.08	NY	1521898	87481	0.0575

DE	
MajorInsuranceOrgName	uod_company
UnitedHealthcare	264.05
BlueCrossBlueShield	133.87
Aetna Health Inc.	117.77
Humana	99.92
Personal Choice 65 PPO	82.71
Cigna	67.65

ID	
MajorInsuranceOrgName	uod_company
BlueCrossBlueShield	519.08
UnitedHealthcare	230.66
PacificSource Medicare	107.91
Humana	104.54
SelectHealth	89.01
Aetna Health Inc.	55.65

NV	
MajorInsuranceOrgName	uod_company
BlueCrossBlueShield	443.81
Humana	207.38
UnitedHealthcare	187.3
Senior Care Plus	170.34
Aetna Health Inc.	117.77
Prominence Health Plan	95.12
SelectHealth	89.01
HMSA Akamai Advantage	66.08
SCAN Health Plan	39.02
Kaiser	29.25

MN	
MajorInsuranceOrgName	uod_company
BlueCrossBlueShield	228.71
South Country Health Alliance	157.66
UnitedHealthcare	145.27
Humana	127.72
UCare	127.21
Aetna Health Inc.	55.65
PrimeWest Health	55.56
HealthPartners	46.11
UCare's MSHO	37.59
Senior Preferred	31.25

MI	
MajorInsuranceOrgName	uod_company
BlueCrossBlueShield	182.37
Humana	173.59
Priority Health Medicare	123.09
UnitedHealthcare	101.32
HAP Senior Plus (PPO)	65.4
Aetna Health Inc.	55.65
Molina Healthcare of Michigan	35.93
WellCare	30.72
HAP Senior Plus	16.11

TN	
MajorInsuranceOrgNar	uod_company
BlueCrossBlueShield	974.09
UnitedHealthcare	157.5
Humana	112.04
Clover Health	63.78
Aetna Health Inc.	55.65
WellCare	32.55
Cigna	18.8

OK	
MajorInsuranceOrgName	uod_company
UnitedHealthcare	329.47
Humana	242.02
Aetna Health Inc.	217.77
BlueCrossBlueShield	196.03
GlobalHealth	89.66
CommunityCare Advantage Medicare Plan (HMO)	48.54
CommunityCare Senior Health Plan (HMO)	38.61

WY	
MajorInsuranceOrgName	uod_company
Aetna Health Inc.	129.29
UnitedHealthcare	109.13
BlueCrossBlueShield	88.05
Humana	57.97

Based on the analysis, there are most insurance companies in the New York States, and we picked up the top-ten companies. United Healthcare has the largest market share in the New York States, while it also has the second-highest UOD rate of 368.13 which means the average use rate of opioids at high dosage is above 368%, shows a server drug addiction among its members. The Blue Cross Blue Shield company shows the highest use of prescription opioids (400.81%) and Well Care holds the lowest UOD (91.08%). But overall, the members of each top-ten companies in the New York States usually has a high rate of overuse drugs, and the companies may need to improve their performances on restricting their members from drug addiction.

There are only four major insurance companies in Wyoming: Aetna Health Inc. United Healthcare, Blue Cross Blue Shield, and Humana. All these companies have a relatively low UOD rate which shows a lower overdose of drugs. In both Delaware and Oklahoma, members of United Healthcare have the highest UOD rate, while the Blue Cross Blue Shield company has the highest UOD rate in Michigan, Tennessee, Idaho, and Nevada. It not only reflects the large size and broad distribution of these two companies but also indicates that the companies need more regulations to avoid a large number of users being drug addiction. The highest percentage of use of opioids at high dosage occurs in Blue Cross Blue Shields in Tennessee, which is 974.09, and the lowest drug overdose percentage is the HAP Senior Plus company in Michigan that we could say it is the local insurance company in Michigan that has the best performance within the state. But the HAP Senior Plus (PPO) which is one of the HAP Medicare plans has a relatively high UOD rate (65.4%).

Overall, United Healthcare and Blue Cross Blue Shield are two insurance companies that always holds the largest market share in the nine states. However, the performances of these two

companies in each state are usually the worst that there is a high percentage of drug-addiction members. Both companies should put more efforts into the regulation of monitoring and helping members get rid of the unsafe use of prescription opioids. On the other side, the most mindful companies that are doing their part to control opioid crisis are: WellCare in New York State, Cigna in Delaware, Aetna Health Inc. in Idaho, Kaiser in Nevada, Senior Preferred in Minnesota, HAP Senior Plus in Michigan, Cigna in Tennessee, CommunityCare Senior Health Plan (HMO) in Oklahoma, and Humana in Wyoming.