

An Analysis of High Deductible and Low Deductible Insurance Plans

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Abstract

In this study, we analyze two health insurance plans, a high deductible and low deductible plan. We determine which plan is more cost effective for both an individual and a four-person family. This study considers various levels of medical expenses, factors in copayments and premiums, and ultimately determines whether a high deductible or low deductible insurance plan is a better deal.

1 Introduction

Decisions regarding health insurance plans are becoming increasingly more complicated as insurance companies begin to offer a variety of plans. There are many factors to consider, including premiums, deductibles, coinsurance, and copayments. The difference between a high deductible insurance plan and a low deductible insurance plan can be extremely significant. A high deductible plan is usually defined as a deductible of over \$1,000 for an individual. According to Katy Kozhimannil, a professor of public health at the University of Minnesota, 34% of Americans have a high deductible insurance plan. This number has nearly tripled since 2008 [2].

At first glance, the high deductible plan may scare health care consumers. Without taking the premium into account, consumers see a deductible over \$1,000 and are immediately deterred from the high deductible plan. A lower deductible is more attractive because consumers are given the comfort of knowing that if they happen to develop an illness and incur larger medical expenses they will be responsible for a smaller out-of-pocket cost before the insurance company begins paying.

Focusing solely on deductibles, however, may not be the best way to determine the most cost effective insurance plans. With so many other factors contributing to healthcare costs, it is not logical to base the decision on just one facet of the insurance plan. This paper aims to determine the most cost effective insurance plan when given the option between a high deductible and low deductible. In this study, we consider factors such as premiums, coinsurance, and copayments along with the deductible in order to determine which plan is the most cost effective.

We begin by introducing two health insurance plans and outlining their premiums, deductibles, coinsurance, out of pocket maximums, and copayments. We then examine the case in which one individual is seeking health care and determine whether the high or low deductible health insurance plan is more economical in the individual case. Next, we expand this analysis to a four-person family. Finally, we analyze the results from both the individual and family cases and aim to come to a conclusion as to the most cost effective insurance plan.

2 Insurance Definitions

Each health insurance plan in this study contains five important factors. First is the monthly premium. The **premium** is the amount paid to the insurance company each month to maintain coverage [1]. In general, a health insurance plan with a lower monthly premium will have a higher deductible. On the other hand, a health insurance plan with a higher monthly premium will commonly have a lower deductible.

The deductible is another important factor in determining the most cost effective health insurance plan. An annual **deductible** is the amount a consumer is required to pay before the insurance company begins paying for medical costs [1]. The deductible is paid out of pocket and monthly premiums do not count towards the deductible. As stated above, the level of the deductible may affect the amount of the monthly premium. Higher deductibles are usually accompanied by lower monthly premiums and the opposite is also true.

Once the annual deductible is met, the insurance company begins paying for a portion of any additional medical costs. The portion not covered by the insurance company, or the portion that the consumer is responsible for, is called the **coinsurance** [1]. For example, if the insurance company pays for 80% of medical costs after the deductible is met, the remaining 20% must be paid by the health care consumer. This 20% is considered the coinsurance.

Some health insurance plans may require copayments for certain medical services. A **copayment**, or copay, is a dollar amount the health care consumer is required to pay upfront for a medical service [1]. For example, a health insurance plan may require a \$20 copay for a general physician office visit or prescription drug. This \$20 must be paid upfront in order to receive the medical service and the copay amount does not count towards the annual deductible.

Health insurance plans also include a maximum out of pocket cost. The **maximum out of pocket cost** is the maximum amount of money the consumer is liable to pay annually after deductibles, copays, and coinsurance [1]. Once a health care consumer reaches the maximum out of pocket cost the insurance company will pay 100% of any additional medical costs. The monthly premium and copay, however, does not count towards the maximum out of pocket cost.

3 Description of Insurance Plans

This study focuses on two different health insurance plans. The first plan, Plan A, has a low deductible with a high monthly premium. The second plan, Plan B, has a high deductible with a low monthly premium. Figure 1 outlines the major cost factors of both Plan A and Plan B for an individual.

	Plan A	Plan B
Monthly Premium	\$274	\$205
Yearly Premium	\$3,288	\$2,460
Deductible	\$375	\$2,000
Maximum Out of Pocket Cost	\$2,250	\$2,000

Figure 1: Individual Costs

Figure 1 shows that, for an individual, Plan A requires approximately \$800 annually in premiums. However, the individual deductible for Plan A is only \$375 compared to a deductible of \$2,000 for Plan B. The maximum out of pocket cost for Plan A is \$2,250. This means that once the consumer has spent \$2,250, not including premiums, the insurance company will pay 100% of all additional medical costs. The maximum out of pocket cost for Plan B is \$2,000, which is the same as the deductible for Plan B. The reason for this will be explained later. These numbers are specific to the individual case. Figure 2 shows the premiums, deductibles, and maximum out of pocket costs for a family.

	Plan A	Plan B
Monthly Premium	\$635	\$475
Yearly Premium	\$7,620	\$5,700
Deductible	\$1,125	\$4,000
Maximum Out of Pocket Cost	\$4,500	\$4,000

Figure 2: Family Cost

Figure 2 shows the difference in cost between Plan A and Plan B for a family. Similar to the individual case, Plan A has a higher monthly premium than Plan B but the deductible for Plan A is much lower than the deductible for Plan B. Again, like the individual case, the maximum out of pocket cost for Plan B is \$4,000 which is also the deductible for Plan B.

The reason the deductible and maximum out of pocket costs for Plan B, in both the individual and family case, are the same involves the coinsurance for the plan. Figure 3 explains the breakup of the coinsurance for Plan A and Plan B. The coinsurance is identical in both the individual and family case.

	Plan A	Plan B
Insurance Company	80%	100%
Out of Pocket	20%	0%

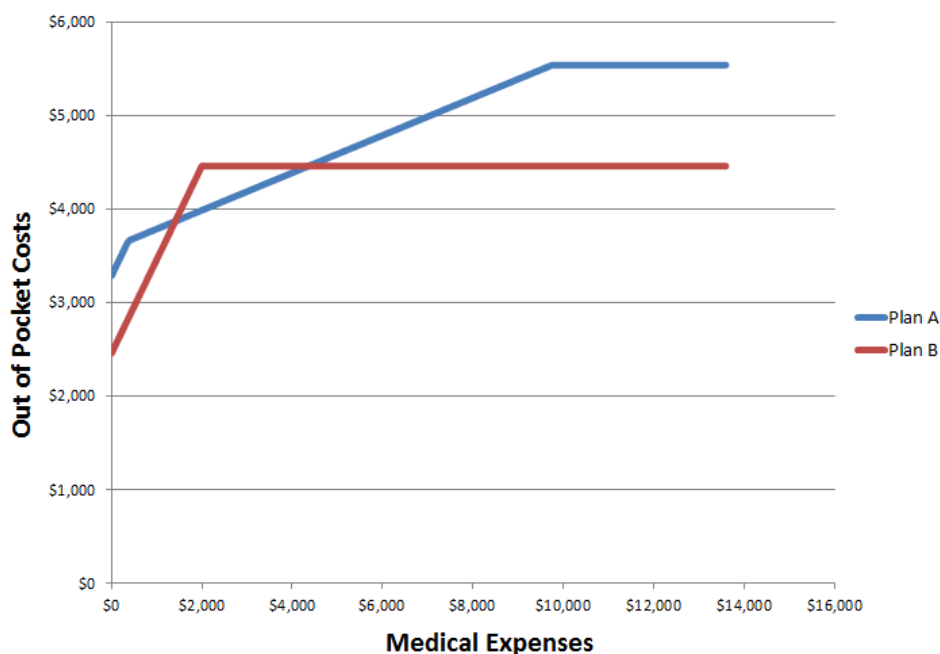
Figure 3: Coinsurance

After the individual or family deductible is met, the insurance company begins paying a portion of any additional medical costs. In Plan A, the insurance company will pay 80% of additional medical costs and the consumer is responsible for the remaining 20%. In Plan B, the insurance company pays 100% of additional medical costs and the consumer will pay nothing. This is the reason that the maximum out of pocket cost in Plan B is the same as the deductible. Once the consumer meets the deductible they will never pay any more out of pocket money for medical services. Therefore, the out of pocket maximum is equal to the deductible.

Plan A also includes some copays. The copay is an amount of money that must be paid out of pocket every time the medical service is received, even after the deductible is met. Plan A's copays include a \$35 copay for a general physician office visit, a \$50 copay for a specialist office visit, a \$100 copay for an emergency room visit, and a \$200 copay for an inpatient hospital visit. Plan B does not require any copays for any medical services.

4 Individual Results

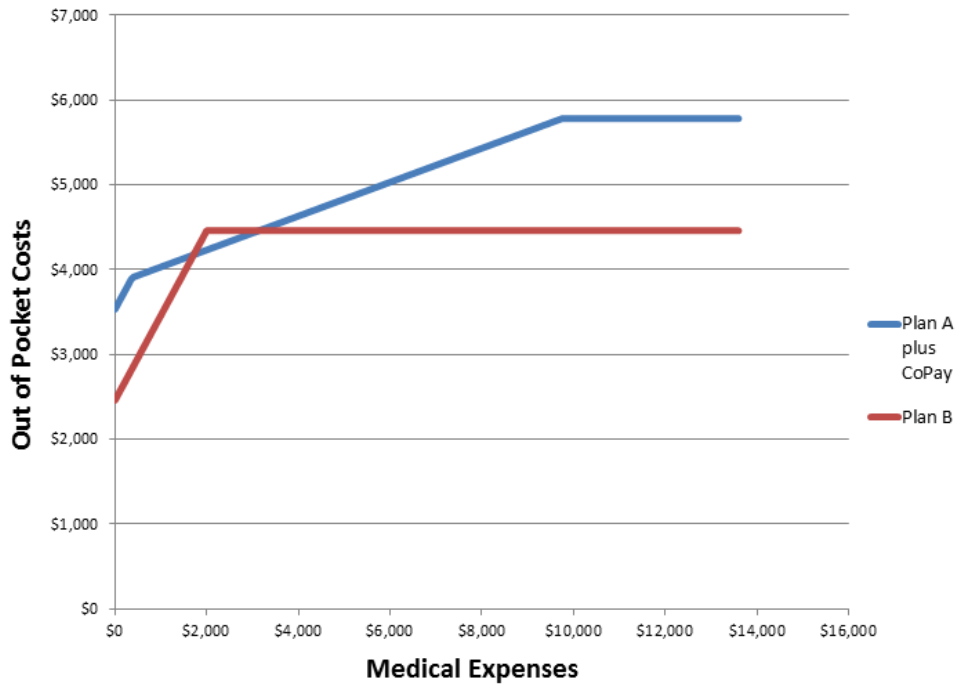
We begin by analyzing the individual case. Graph 1 shows medical expenses on the horizontal axis and out of pocket costs on the vertical axis. This graph shows how much a health care consumer would pay out of pocket at various levels of medical expenses. The graph includes yearly premiums. The annual premiums must be paid whether or not any money is spent on medical expenses throughout the year. This explains why the y-intercept on the graph, or the point on the graph where medical expenses are equal to zero, is not zero but rather equal to the amount of the yearly premium. The blue line represents Plan A, which is the low deductible insurance plan, while the red line represents Plan B, which is the high deductible insurance plan.



Graph 1: Individual Plan A vs. Plan B

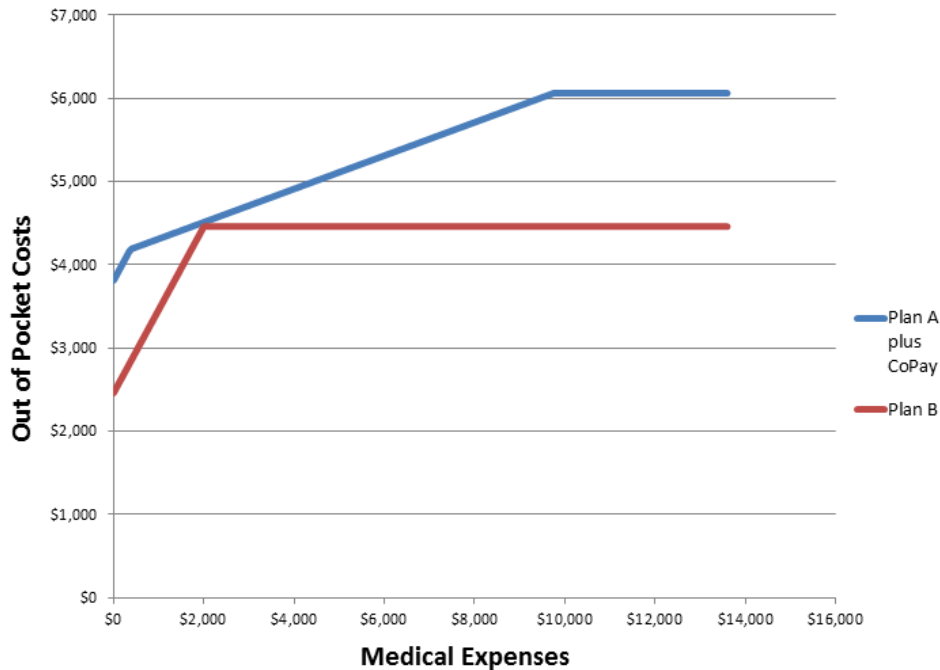
Graph 1 does not include any copays for Plan A. In other words, Graph 1 assumes that the health care consumer did not receive any medical service that required a copay. The graph shows that there is a small window, between approximately \$1,500 and \$4,500, where the red Plan A line is above the blue Plan B line. This suggests that the high deductible Plan B will be more expensive between \$1,500 and \$4,500 in medical expenses. However, excluding the \$1,500 to \$4,500 window, the low deductible Plan A line is always above the high deductible Plan B line, suggesting that generally the high deductible Plan B is more cost effective.

Graph 2 considers Plan A with copays against Plan B. With the addition of seven \$35 copays, the blue Plan A line moves upward, decreasing the window in which the high deductible Plan B is more expensive. Without copays, Plan B was more expensive between \$1,500 and \$4,500. Now, Plan B is more expensive between approximately \$1,700 and \$3,200. This is a decrease from a \$3,000 window to a \$1,500 window.



Graph 2: Individual Plan A Plus Copay vs. Plan B

Graph 3 shows the amount of copays needed to ensure that the low deductible Plan A will always be more expensive than the high deductible Plan B. In this graph, Plan A is assuming fifteen \$35 copays. In other words, if a health care consumer had fifteen or more general physician office visits in one year, the high deductible Plan B would be more cost effective at any level of medical expenses.



Graph 3: Individual Plan A Plus Copay vs. Plan B

5 Family Results

Now we will analyze the results for a four-person family. First, it is important to understand that while there is a family deductible for each plan, the individual deductible still applies. In other words, it is possible for the family as a whole to meet their family deductible while only one or two members meet their individual deductible. For example, the family deductible for Plan A is \$1,125 and the individual deductible for Plan A is \$375. If one family member spends \$1,000 in medical expenses and the remaining three family members spend \$200 in medical expenses, then the entire family will have spent \$1,600 in medical expenses in that year. This meets the \$1,125 deductible, but the first family member is the only one to have met the individual \$375 deductible.

In order to organize the medical expenses for all four family members, each member was given an individual spreadsheet in Microsoft Excel. Figure 4 shows an example of this spreadsheet. We chose distinct values for medical expenses and a number for general physician office visits. The addition of these office visits allows us to factor in copays for each family member. We used \$35 copays for this analysis. We then calculated how much the family member pays out of pocket for Plan A and Plan B for each level of medical expenses. Each family member's spreadsheet includes the exact same numbers for medical expenses which then gives them the same dollar amounts for their out of pocket costs.

Medical Expenses	Number of Visits	Out of Pocket Cost Plan A	Out of Pocket Cost Plan B
0	0	0	0
300	2	370	300
500	3	505	500
1000	6	710	1000
3000	10	1250	2000
6000	13	1955	2000
8000	15	2250	2000

Figure 4: Family Member Excel Spreadsheet

After the out of pocket costs for each family member have been calculated, we took combinations of the seven different levels of medical expenses to create a family spreadsheet. Figure 5 shows a portion of the family spreadsheet.

	Medical Expenses	Out of Pocket Family Plan A	Out of Pocket Family Plan B
300, 3000, 0, 0	3300	8844	8000
300, 300, 3000, 0	3600	8918	8300
300, 300, 300, 3000	3900	8992	8600
3000, 500, 300, 300	4100	9019	8800
3000, 1000, 300, 300	4600	9060	9300
3000, 1000, 500, 500	5000	9114	9700
3000, 3000, 300, 300	6600	9168	9700
3000, 3000, 500, 300	6800	9195	9700
6000, 500, 300, 0	6800	9086	8500
6000, 300, 300, 300	6900	9133	8600
3000, 3000, 1000, 300	7300	9236	9700
6000, 1000, 500, 0	7500	9154	9200
8000, 500, 300, 300	9100	9219	8800
3000, 3000, 3000, 300	9300	9344	9700
3000, 3000, 3000, 500	9500	9371	9700
3000, 3000, 3000, 1000	10000	9412	9700
8000, 3000, 500, 500	12000	9422	9700
3000, 3000, 3000, 3000	12000	9520	9700
8000, 6000, 500, 300	14800	9536	9700
6000, 6000, 3000, 1000	16000	9694	9700
8000, 6000, 1000, 1000	16000	9645	9700
8000, 8000, 300, 300	16600	9568	9700
8000, 6000, 3000, 500	17500	9712	9700
8000, 6000, 3000, 1000	18000	9753	9700

Figure 5: Entire Family Excel Spreadsheet

The left column of this spreadsheet shows the distribution of medical expenses across the four family members. The Medical Expenses column totals up the amount of medical expenses each family member has accrued throughout the year. We then calculated the out of pocket expenses for the low deductible Plan A and high deductible Plan B, keeping in mind both the family deductible and whether or not each individual family member had met the individual deductible. The yellow highlight shows which plan was more cost effective.

It is important to note that it is possible to have two distinct distributions of individual medical expenses add up to the same amount in family medical expenses. For example, Figure 6 shows a case in which the family as a whole spent \$6,800 in medical expenses in a year. The two cases are outlined in orange.

	Medical Expenses	Out of Pocket Family Plan A	Out of Pocket Family Plan B
3000, 1000, 500, 500	5000	9114	9700
3000, 3000, 300, 300	6600	9168	9700
3000, 3000, 500, 300	6800	9195	9700
6000, 500, 300, 0	6800	9086	8500

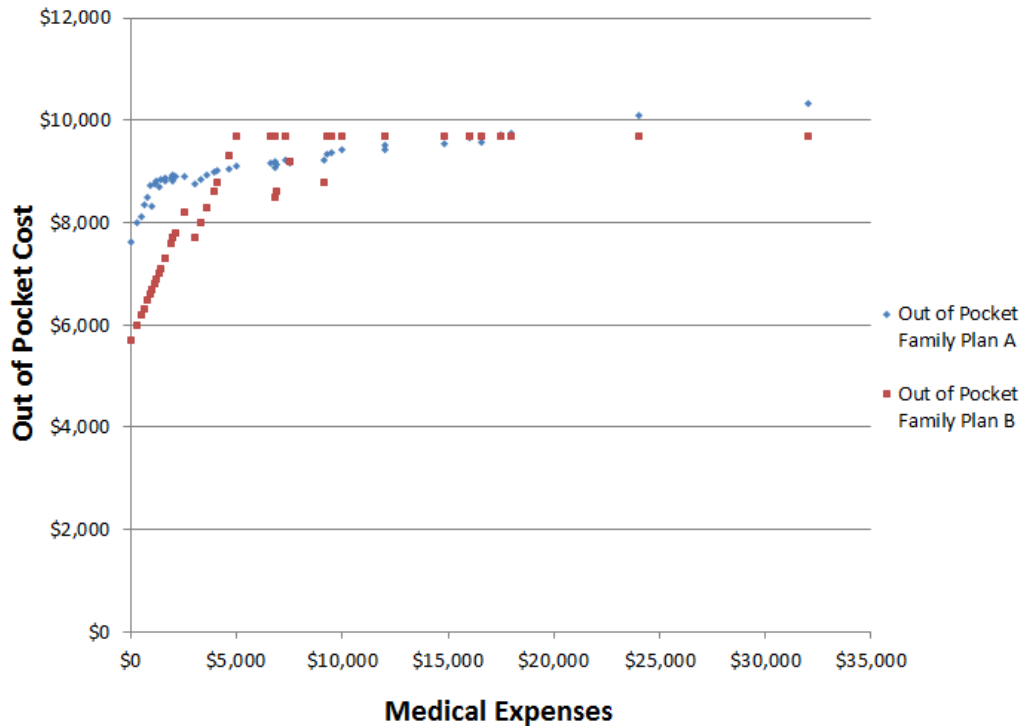
Figure 6: Family Spreadsheet

In the first case, the first two family members spent \$3,000 in medical expenses. The third family member spent \$500 and the final family member spent \$300. In this example, the first three family members met the individual deductible of \$375 while the fourth member did not. In this example, the low deductible Plan A is less expensive than the high deductible Plan B.

In the second case, the first family member spent \$6,000 in medical expenses. The second member spent \$500, the third member spent \$300, and the fourth family member had no medical expenses in the year. In this example, only the first two family members met the individual \$375 deductible while the last two family members did not. The high deductible Plan B is more cost effective than the low deductible Plan A in the second case.

Figure 6 shows that the entire family's medical expense in a year is not the only factor in determining the most cost effective plan. It is also important to consider how many of the four family members have met their individual deductible, as this can alter the out of pocket expenses for the family in each plan.

Graph 4 is a scatter plot that shows the entire family's medical expenses on the horizontal axis and the out of pocket cost on the vertical axis. Similar to the individual case, this graph includes the yearly premium for both Plan A and Plan B.



Graph 4: Family Plan A vs. Plan B

Due to the way the individual deductible can alter the family’s out of pocket costs for each plan, the graph does not follow a linear pattern like the individual case. It is more difficult to choose one plan that is more cost effective over the other plan because the points on the graph are more scattered and less uniform. It appears that at medical expenses less than \$5,000 the high deductible Plan B is more cost effective. However, after the \$5,000 mark there is not a clear winner.

6 Discussion

In the individual analysis, there was a fairly clear conclusion as to which insurance plan was more cost effective. The two plans analyzed in this study were a low deductible plan, Plan A, and a high deductible plan, Plan B. Plan A had an individual deductible of \$375 and an annual premium of \$3,288. On the other hand, Plan B had an individual deductible of \$2,000 and an annual premium of \$2,460.

The first analysis of the individual plans found a window from approximately \$1,500 to \$4,500 in medical expenses in which the high deductible Plan B was more expensive than the low deductible Plan A. This analysis did not factor in any copays for Plan A. After factoring in copays, the \$3,000 window shrinks with each additional copay. We found that after adding fifteen \$35 copays, the high deductible Plan B is always more cost effective than the low deductible Plan A. In general, after factoring in copays, premiums, and coinsurance, this study concludes that the high deductible plan is more cost effective for an individual.

When analyzing the four-person family case, it was much more difficult to come to a conclusion regarding the cost effectiveness of the insurance plans. For a family, Plan A had a deductible of

\$1,125 with an annual premium of \$7,620. Plan B had a deductible of \$4,000 with an annual premium of \$5,700.

In the analysis of the family case, it became apparent that the family deductible was not the only factor in determining cost effectiveness. The number of family members who met their individual deductible had an impact on which plan was less expensive. We found that at medical expenses less than \$5,000 annually, the high deductible Plan B was more cost effective. However, after \$5,000 of medical expenses, there are cases in which Plan A is more cost effective and there are cases in which Plan B is more cost effective.

7 Directions for Further Research

For the purpose of this study, the insurance plans used were simplified slightly. For example, the coinsurance we used for the low deductible Plan A was 20%. However, in reality, the coinsurance varied for certain medical services. In general, the insurance company paid 80% of additional medical costs, but certain services had different coinsurance amounts. For example, for an emergency room visit, the insurance company pays 70% of costs while the consumer is responsible for the remaining 30%. In future research, it would be interesting to take varying levels of coinsurance into account when computing the out of pocket cost for each plan.

We also chose not to consider prescription drugs in this study. Many prescription drugs have copays, which was a significant factor in this study of cost effective insurance plans. The inclusion of prescription drugs may give interesting insights into which plan is more cost effective and would be another area of study for further research on this topic.

Finally, this study focused only on two insurance plans. However, many times there are several options when choosing the best insurance plan. Expanding this study to include more insurance plans with varying premiums, deductibles, and coinsurance amounts would provide a realistic comparison of all options available to a health care consumer.

8 Conclusion

The choice between a high deductible or low deductible insurance plan is not a straightforward decision. There are several factors to consider, such as premiums, copays, and coinsurance. This study suggests that a high deductible plan with a lower premium and coinsurance is generally a more cost effective decision in comparison to the low deductible plan. This gives one reason for the increase in Americans with high deductible insurance plans since 2008 [2]. While the thought of higher out of pocket costs upfront associated with a high deductible may scare consumers, it is shown to be more cost effective in the long run.

References

[1] "Health Insurance Buyer's Guide." *Health Insurance Buyers Guide*. N.p., n.d. Web. 01 Dec. 2013. <<http://www.ehealthinsurance.com/individual-health-insurance/resources/buyers-guide/page2/>>.

[2] Tahir, Darius. "National Journal." *NationalJournal.com*. N.p., 2 Oct. 2013. Web. 04 Dec. 2013. <<http://www.nationaljournal.com/innovations-in-health/high-deductible-plans-may-not-be-what-they-re-cracked-up-to-be-20131002>>.

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