

# Drugs industry and obesity: an analysis to Cholesterol products

Doaa Salman Abdou\*, Dina Ali

Professor of economics and finance, Head of economics department – Associate Dean, October University for Modern Sciences and Arts, Egypt

**Abstract:** The paper discusses the market by seeing two medicines which are Niaspan and Zetia that decrease the cholesterol in the body. Through the paper, we will see that both the drugs are considered to be oligopoly market competition followed by the market analysis of the cholesterol medicine in the US from 2011 till 2013 and to check the elasticity of demand from the demand the curve for both the drugs. Later, we come to see the factors that affect the demand and supply for Niaspan and Zetia. Lastly, we end the paper with a conclusion about future expectations and suggestions for the pharmaceutical medicines that can enhance their performances.

**Publication date:** February, 2020

**Publication online:** 29 February, 2020

**\*Corresponding author:** Doaa Salman Abdou, dsalman@msa.eun.eg

## 1 Introduction

Health is one of the precious things in a human being's life. Each one of us tries always to take care of their health. In the USA, the Centers for Medicare and Medicaid Services (CMS) found that \$9,596 was spent by the average American on health care in 2012 (Bloom, 2017). However, it was found that the percentage of Americans who are overweight (BMI 25 to < 30) in 2012 was 36.1% (Brown, 2018), also the US is ranked the 12th as one of the most obese countries in the world (Dillinger, 2015). According to the World Health Organization (2017), fast food and soft drinks intake play trouble in high obesity that leads to high cholesterol.

High cholesterol is a main and modifiable risk factor

for heart disease and stroke, respectively the leading and fifth-leading causes of death in the U.S.A. High cholesterol is generally defined as high total blood cholesterol, usually breaking down to high-density lipoprotein (LDL) cholesterol ("bad" type) and low-density lipoprotein (HDL) cholesterol ("good" type). A total of 240 mg / dL or higher blood cholesterol is an unhealthy amount, especially if held for long periods (American Health Rankings, 2018). In addition, people who are unable to make diet and exercise go for tablets to be able to decrease LDL and weight.

The research is divided into different sections as we start with abstract, then the introduction followed by a literature review that discusses the oligopoly market competition. Later on, it discusses the market analysis of the cholesterol medicines in the US that are Niaspan and Zetia and how the elasticity of demand is affected. Then the factors affecting the demand for Niaspan and Zetia are the price of related goods, the income of the consumer and number of population. After that factors that affect the supply like the price of related goods, the number of firms in the industry, and price of factors of production. Eventually, we end the research with a conclusion that shows the future expectation of both the drugs.

## 2 Literature Review

The cost of health care and pharmaceutical products were increasing highly since 1950 with around 4.5% from the GDP, then in 2004 approximately 16.0% that's almost 0.7 trillion dollars, besides in 2008 the cost reached 2.3 trillion dollars on health care. The business and the federal government supply part of the funds (Spitz & Wickham, 2012).

The pharmaceutical industry is considered to be an oligopoly market competition because it is a kind market that exists a few big firms and a large number of buyers. Each seller has a significant share of the market. In the oligopoly, there are a few but large, so each industry has its significance in the market and can impact the market price of the product, besides there is a large number of buyers in the market. The number is so large that no individual buyer can impact the market price of the product. There are various barriers to the entry of new firms, the barriers are almost similar to those under monopoly. Entry at the new firm is extremely difficult, but not impossible. Furthermore, to avoid competition industries may form a cartel. Cartel is a formal agreement among the firms to avoid competition in the market. In oligopoly market prices are controllable, each rival firm reacts immediately to the changed price due to which the price remains rigid in the market, also industries tend to avoid price competition (Craig & Malek, 1995).

In the oligopoly the shape of the demand curve is indeterminate because if one firm reduce the price we cannot say the firm can sell more. Their existing price rigidity and cartels. There are two types of oligopoly collusive and non-collusive. The first type is collusive, it is a form of market in which there are few firms in

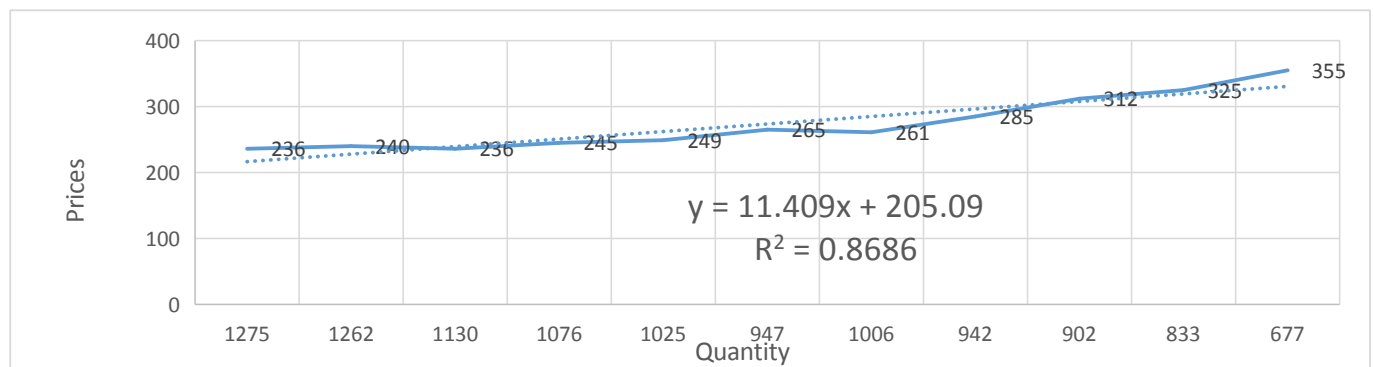
the market and all decided to avoid competition through a formal agreement. They collude to form a cartel and fix for themselves output quotas and market price. Sometimes a leading firm in the market is accepted by the cartel as a price leader. Members of the cartel accept the price as fixed by the price leader. The second type is non-collusive, it is the form of a market in which there are few firms in the market and each firm fixes its price and output and all firms are independent of the rival firms. Each firms tries to increase its market share through competition. Competition is preferred as a means of profit maximization because of a few firms in the market; there is cut throat competition.

### 3 Market Analysis of the Cholesterol medicine in US

#### 3.1 Niaspan

Niaspan (Niacin ER) is a medication on a prescription that is used with exercise and diet to reduce cholesterol once the diet and exercise have failed. Niaspan engages to decrease the LDL which is the “bad cholesterol” and increase the HDL that is “good cholesterol” and reduce triglycerides (a type of fat) in your body. Besides, it also lowers the chance of getting a heart attack (Niaspan, 2018) (Figure 1).

Figure 1. Demand Elasticity of Niaspan from Q1 2011 till Q3 2013



Source: Quarterly Niaspan Sales Data & Retail Statistics Information: Drugs.com

Figure one represents the demand curve of the cholesterol medicine ‘Niaspan’ which is upward sloping in opposite to the real demand curve which is downward sloping. The reason behind why the curve is different is due to the elasticity of demand. In most of the quarters the data is elastic but in some it was found to be inelastic this was due that the heart attacks were not avoided by the drug. However, the sales were increasing by promoting the HDL and lower the LDL (Japsen, 2011).

There are factors that affect the elasticity of demand one of them is different uses, Niaspan is used for variety of purposes like lowering triglycerides (fats) and bad cholesterol also prevents the repeating heart attacks for those who have high cholesterol (Iodine, 2019) that leads to high elasticity.

Another factor that affect elasticity is nature of the product from the table it is found that most of the quarters the medicine is elastic because Niaspan is used for lowering triglycerides, but it’s not effective as

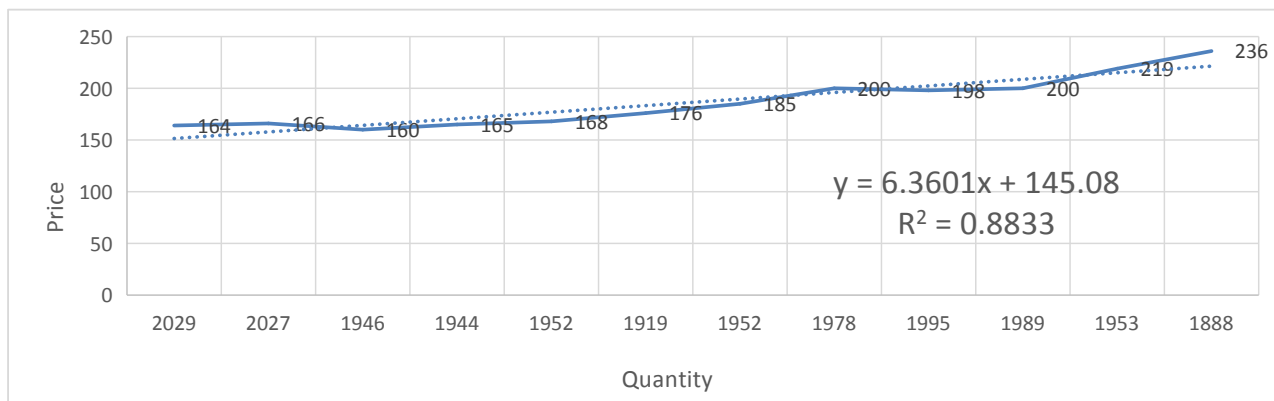
statins (medications used for lowering cholesterol).

### 3.2 Zetia

Zetia (Ezetimibe) is ranked the 28th in sales in the

U.S Pharmaceuticals, it's also medication that reduce the bad cholesterol and increase the good cholesterol, besides it can be used with other drugs (Merck, 2013) (Figure 2).

Figure 2. Demand Elasticity of Zetia from Q1 2011 till Q4 2013



Source: Quarterly U.S. Sales Data for Zetia: Drugs.com Statistics

Figure two shows the elasticity demand of the drug of Zetia which is also upward sloping curve, the reason behind that is the elasticity of demand is inelastic. There are factors that show the effects on elasticity of demand; firstly, nature of the product, the Zetia product is considered to be a necessity product for people who suffer high cholesterol; the medication works by blocking cholesterol's intestinal absorption separately from the resins. A 10-mg dose alone can reduce the levels of LDL cholesterol by 17 percent –19 percent, which is a major benefit. If added to a statin medication, ezetimibe can produce additional LDL reductions of approximately 25% without raising the risk of side effects of statin (Harvard Health Publishing 2014). Secondly, availability of substitute, the medicine Zetia can be used to replace statins. Thirdly, different uses, Zetia is used for hereditary disorders with high cholesterol

high cholesterol (Iodine, 2019).

### 4 Factors affecting the demand for Niaspan and Zetia

The pharmaceutical industry is highly affected by three following factors: price of related goods, the income of the consumer, the number of population and technology. Firstly, related goods are of two types: substitute and complementary good, both of the drugs are considered to be substitute goods since they can substitute each other. When the price of one commodity increases, the demand for other commodities increases. Zetia is considered to be an alternative for Niaspan and also the statins. We can realize in Table 1 and 2 that when the price of one medicine increases, the demand for the other medicine increases.

Table 1. Elasticity of demand of Niaspan from Q1 2011 till Q3 2013

Year	Price	Quantity demand	% change in QD	% Change in price	Elasticity of demand
Q1 2011	236	1275			
Q2 2011	240	1262	-0.010248325	0.016806723	-0.609775325
Q3 2011	236	1130	-0.110367893	-0.016806723	6.566889632
Q4 2011	245	1076	-0.048957389	0.037422037	-1.308250227
Q1 2012	249	1025	-0.04854831	0.016194332	-2.997858163
Q2 2012	265	947	-0.079107505	0.062256809	-1.2706643
Q3 2012	261	1006	0.060419867	-0.015209125	-3.972606247
Q4 2012	285	942	-0.065708419	0.087912088	-0.747433265
Q1 2013	312	902	-0.043383948	0.090452261	-0.479633647
Q2 2013	325	833	-0.079538905	0.040816327	-1.94870317
Q3 2013	355	677	-0.206622517	0.088235294	-2.341721854

Data Source: Quarterly Niaspan Sales Data & Retail Statistics Information: Drugs.com

**Table 2.** Elasticity of demand of Zetia from Q1 2011 till Q4 2013

Year	price	Quantity demand	% change of QD	% Change in price	Elasticity of Demand
Q1 2011	164	2029			
Q2 2011	166	2027	-0.000986193	0.012121212	-0.081360947
Q3 2011	160	1946	-0.040775233	-0.036809816	1.107727158
Q4 2011	165	1944	-0.001028278	0.030769231	-0.033419023
Q1 2012	168	1952	0.004106776	0.018018018	0.227926078
Q2 2012	176	1919	-0.017049858	0.046511628	-0.366571945
Q3 2012	185	1952	0.017049858	0.049861496	0.341944373
Q4 2012	200	1978	0.013231552	0.077922078	0.169804919
Q1 2013	198	1995	0.008557765	-0.010050251	-0.851497609
Q2 2013	200	1989	-0.003012048	0.010050251	-0.299698795
Q3 2013	219	1953	-0.01826484	0.090692124	-0.201393896
Q4 2013	236	1888	-0.033845353	0.074725275	-0.452930456

Data Source: Quarterly U.S. Sales Data for Zetia: Drugs.com Statistics

Secondly, the income of the patient, change in income affects the demand for different goods in different. There are two types of goods normal goods and inferior goods. In the case of the normal good income, the effect is positive. That's when income increases the demand for the normal good increases since Niaspan and Zetia are medicines they are normal goods for people who suffer high cholesterol. The first defense against high cholesterol is a healthy lifestyle, but sometimes diet and exercise are not enough, and cholesterol medications may need to be taken (Mayo Clinic, 2018).

Thirdly, the population, when the population increases the number of people in the market will increase, so the demand will also increase. In this case its number of adults having cholesterol. It is being taken by just over half of the U.S. adults (55 percent, or 43 million) who could benefit from cholesterol (Mercado, DeSimone, Odom, Gillespie, Ayala, Loustalot, 2015). Thus, it increases the demand for both the medicines Zetia and Niaspan.

## 5 Factors that affect the supply for Niaspan and Zetia

The pharmaceutical industry is highly affected by three following factors price of related goods, the number of firms in the industry and cost of production. Firstly, the supply of goods depends upon the price of related goods; that's Niaspan can substitute or an alternative for Zetia and Zetia can substitute statins. If the price of Niaspan decreases, the producers are willing to sell more of Zetia and less of Niaspan.

Secondly, the market supply of a commodity depends

upon the number of firms in the industry. If the number of firms increases in the market, the supply will increase. So we can see that there are a lot of numbers of cholesterol medications in the U.S.; therefore, the supply of both Niaspan and Zetia are increasing.

Thirdly, the supply of a commodity is also affected by the price of factors of production. If the cost of factors of production decreases, it will encourage to produce more and supply will increase. In the case of Zetia to produce 90 oral tablets the cost will be \$12.11 per unit, so the price total will be \$1,090.04. Whereas, Niaspan to produce 90 oral tablets the cost will be \$5.50 per unit and the total price will be \$495.11 (Drugs.com, 2019).

Fourthly the technology, under technology the producers uses two ways to produce goods, modern and outdated technology. In the case of the pharmaceutical industry, they spend on the research and development to be able to produce effective medicines that make the supply to increase.

## 6 Conclusion

To sum up, we can say that both Niaspan and Zetia are substitute goods, but when the cross elasticity of demand is calculated (Table 3) we can see that in most of the quarters they are complementary since Zetia was found to be inelastic and Niaspan is elastic in most of the quarters. This was because Zetia was a good alternative for statins when people can afford it, but Niaspan wasn't an alternative for statins. In addition, the demand graph of both the drugs was upward sloping in reverse of the actual demand curve which is downward sloping due to different factors that affect

the elasticity of demand like different users, nature of the product, and availability of a substitute. Later on, some factors affect the demand of both the medicines that is the price of related goods, the income of the

consumer, and the number of population; on the other hand, some factors affect the supply also like the price of related goods numbers of the firms in the industry and technology.

**Table 3.** Cross elasticity of Demand (Niaspan/ Zetia)

% Change of Quantity (Zetia)	% Change in Price (Niaspan)	Cross elasticity of Demand
-0.000986193	0.016806723	-0.058678501
-0.040775233	-0.016806723	2.426126353
-0.001028278	0.037422037	-0.027477863
0.004106776	0.016194332	0.253593429
-0.017049858	0.062256809	-0.273863343
0.017049858	-0.015209125	-1.121028158
0.013231552	0.087912088	0.150508906
0.008557765	0.090452261	0.094610845
-0.003012048	0.040816327	-0.073795181
-0.01826484	0.088235294	-0.207001522

Done by the researcher

To improve the sales of both the industries the side effects have to be decreased and that can happen by more research and development. The industries need to build a relationship with the patients to collect data and understand their experience with the drug and to upgrade it. Besides, there needs to be transparency about the medicine where the patient will be able to access data of medicine and technology.

## References

- [1] America's Health Rankings . (2018). Public Health Impact: High Cholesterol. Retrieved from [https://www.americashealthrankings.org/explore/annual/measure/High\\_Chol/state/ALL](https://www.americashealthrankings.org/explore/annual/measure/High_Chol/state/ALL).
- [2] Bloom, E. (2017, June 23). Here's how much the average American spends on health care. Retrieved from <https://www.cnbc.com/2017/06/23/heres-how-much-the-average-american-spends-on-health-care.html>.
- [3] Brown, A. (2018, July 24). In U.S., Obesity Rate Stable in 2012. Retrieved from <https://news.gallup.com/poll/160061/obesity-rate-stable-2012.aspx>.
- [4] Craig, A. M., & Malek, M. (1995). Market structure and conduct in the pharmaceutical industry. *Pharmacology & therapeutics*, 66(2), 301-337.
- [5] Dillinger, J. (2015, November 2). The Most Obese Countries In The World. Retrieved from <https://www.worldatlas.com/articles/29-most-obese-countries-in-the-world.html>.
- [6] Harvard Health Publishing. (2014, March). Help for your cholesterol when the statins won't do. Retrieved from [https://www.health.harvard.edu/newsletter\\_article/help-for-your-cholesterol-when-the-statins-wont-do](https://www.health.harvard.edu/newsletter_article/help-for-your-cholesterol-when-the-statins-wont-do).
- [7] Iodine. (2019). Compare Niaspan vs Zetia. Retrieved from <https://www.iodine.com/compare/niaspan-vs-zetia>.
- [8] Japsen, B. (2018, September 5). Abbott cholesterol drug Niaspan losing sales. Retrieved from <https://www.chicagotribune.com/business/ct-xpm-2011-07-21-ct-biz-0721-abbott-niaspan-20110721-story.html>.
- [9] Mayo Clinic. (2018, November 20). Cholesterol medications: Consider the options. Retrieved from <https://www.mayoclinic.org/diseases-conditions/high-blood-cholesterol/in-depth/cholesterol-medications/art-20050958>.
- [10] Mercado C, DeSimone AK, Odom E, Gillespie C, Ayala C, Loustalot F. Prevalence of cholesterol treatment eligibility and medication use among adults—United States, 2005–2012. *MMWR*. 2015;64(47):1305–11.
- [11] Merck. (2013). ZETIA® (ezetimibe) Tablets. Retrieved from [https://www.merck.com/product/usa/pi\\_circulars/z/zetia/zetia\\_ppi.pdf](https://www.merck.com/product/usa/pi_circulars/z/zetia/zetia_ppi.pdf).
- [12] Quarterly Niaspan Sales Data & Retail Statistics Information. (n.d.). Retrieved from <https://www.drugs.com/stats/niaspan>.
- [13] Quarterly U.S. Sales Data for Zetia: Drugs.com Statistics. (n.d.). Retrieved from <https://www.drugs.com/stats/zetia>.
- [14] Spitz, J., & Wickham, M. (2012). Pharmaceutical high profits: the value of R&D, or oligopolistic rents?. *American journal of economics and sociology*, 71(1), 1-36.
- [15] World Health Organization. (2017, May 8). The influence of market deregulation on fast food consumption and body mass index: a cross-national time series analysis. Retrieved from <https://www.who.int/bulletin/volumes/92/2/13-120287/en/>.
- [16] Zetia Prices, Coupons & Patient Assistance Programs. (n.d.). Retrieved from <https://www.drugs.com/price-guide/zetia>.