ABC Pharmacy – Gross Sales Analysis

DSA 5010A – Foundations of Data Management

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Executive Summary

Background. The primary goal of this gross sales analysis is to derive valuable business insights from point-of-sales (POS) transaction data in order to significantly grow monthly gross sales for the ABC Pharmacy chain (the client). ABC pharmacy is a chain of over 1000 stores providing retail pharmacy goods to a diverse set of customers. The client currently operates a high density of stores in the New England and the mid-Atlantic areas.

Key Findings. A comprehensive gross sales analysis of the ABC pharmacy chain highlighted key areas for gross sales improvement and opportunities for substantial growth. Key findings of the analysis include the following…

- Stores with high gross sales are located in urban areas and serve a diverse customer base.
- A relationship between gross sales and store density was established to identify certain underserved geographic areas potentially ripe for further investment.
- Stores with poor gross sales performance are typically located in rural areas with a customer base that may be comprised of an aging demographic.
- Stores with poor gross sales performance situated in areas with high store density were identified and put forth as candidates for store consolidation.
- A small number of stores were identified for training and/or equipment upgrades due to inaccuracies in POS transaction data.

Conclusions and Recommendations. Geographic areas such as Harrisburg, PA, New Haven, CT and Queens, NY were identified as potential areas for further store expansion due mainly to consistently high gross sales in regions with low store density. Similarly, the analysis also identified that stores with poor gross sales performance tend to sell mainly product types consistent with an aging demographic. Improvements in gross sales in these geographic locations are possible by specifically catering to this particular demographic. Finally, the analysis also identified a small number of stores with poor gross sales performance that are operating in urban areas with high store density. These stores are strong candidates for consolidation which will improve operating expenses and profitability for the ABC Pharmacy Chain.

Gross Sales Analysis of ABC Pharmacy

Introduction. Gross sales are defined as the sum total of all product sales during a defined reporting period prior to any adjustments related to returns, discounts or tax. Gross sales are an important business metric utilized to measure the capability of the business to attract customers and generate sales. This analysis will focus on leveraging a wealth of point-of-sales transactions to derive and analyze average monthly gross sale metrics for stores within the ABC pharmacy chain. This analysis will identify those stores that are clearly over and underperforming during the first six months of 2016 , with the main goal of identifying areas of improvement and growth. The ultimate goal is to provide the client (ABC Pharmacy) with a clear roadmap to improve overall gross sales and ultimately profitability for the chain.

Data Description. The following data analysis focuses principally on deriving key valuable business insights from the analysis of point-of-sales (POS) transactions, mainly gross sales, for the ABC Pharmacy chain during the first six months of 2016. The data analysis will leverage a database that centrally contains details about point of sales transactions from all ABC pharmacy stores for the first six months of 2016. Every transaction recorded includes details concerning sales revenue, product identification and the specific pharmacy where the purchase was made. To augment this data analysis the database also contains information concerning the categorization of all products sold. Products supplied by the client are broken down in hierarchal fashion by major product category, product category, product sub-category and then by product segment. By appropriate merging of data frames on matching foreign/primary keys, it will be possible to essentially link product categorizations to gross sales information and pharmacy details. A full entity relationship diagram (ERD) of the ABC Pharmacy database illustrating the relevant tables and attributes for ABC Pharmacy is shown in Figure 1.

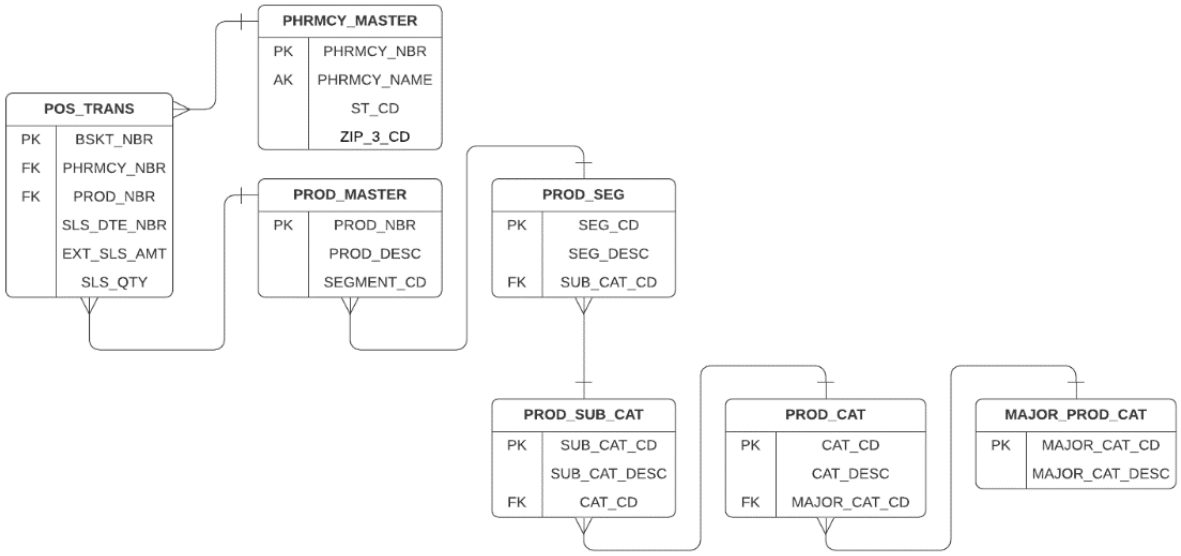


Figure 1. Entity relationship diagram of the ABC Pharmacy database.

In order to execute a gross sales analysis it will be necessary to access attributes from the POS_TRANS and PHRMCY_MASTER tables. For the purposes of this analysis, gross sales is defined as the total value of individual transactions in the POS data frame prior to any adjustments related to product returns or discounts. The database contains information about product categorization arranged in a hierarchal fashion in the following order: PROD_CAT, PROD_SUB_CAT, PROD_SEG and PROD_MASTER. In order to connect any gross sales trends to products or classes of products, it will be necessary to access all product categorization tables, with a primary focus on PROD_SEG and PROD_CAT.

The POS transaction data of interest is detailed in the 'pos_trans' table and contains specific information regarding each individual transaction recorded in the POS database. Each individual transaction is identified by a unique basket ID (BSKT_ID) and affords detail about what was purchased and when (PROD_NBR, SLS_DTE), how many items were purchased at a specific price (SLS_QTY, EXT_SLS_AMT), and from what specific pharmacy (PHRMCY_NBR).

For the purposes of this analysis, POS transactions were grouped into four distinct categories based upon the values reported for sales quantities and prices (Table 1). This categorization is hinged on the

assumption that positive cash flow for the ABC operation is recorded as a positive (EXT_SLS_AMT > 0) sales price. Similarly, common inventory management practices dictate that goods removed from inventory from a valid transaction are also recorded as a positive (SLS_QTY > 0) sales quantity. For the purposes of this analysis, gross sale transactions were thus defined as having positive values for both sales quantity and price.

Table 1. A summary of the type of transactions recorded in the point of sale (POS) registry.

Transaction Type	Sales Price ($)	Sales Quantity (#)	# of Transactions
Gross Sales	> 0 (positive)	> 0 (positive)	906451
Returns - Returned To Inventory	< 0 (negative)	< 0 (negative)	4076
Returns - Removed From Inventory	< 0 (negative)	> 0 (positive)	1
Voids	0	0	4592
Other	> 0 (positive)	< 0 (negative)	624

Similarly, transactions having a negative value for sales price indicate that cash was returned to the customer. These transactions were considered classical product returns and were further broken down by whether the product was returned to, or removed from, inventory. Many product returns involved returning the product to inventory, with one isolated case seemingly related to a product removed from inventory. Within the POS registry, there were a total of 4077 (0.45%) transactions related to product returns. Transactions attributable to product returns were not included in the analysis of gross sales as per standard practices.

Any transaction having a zero value for either sales quantity or sale price was considered to be a void transaction, a transaction that was canceled in process prior to the receipt of cash from the customer. Within the POS registry, there were a total of 4592 (0.50%) related to void transactions. Void transactions were recorded at a variety of locations and involved a variety of product types (Table 2). As per standard practices, transactions attributable to void transactions were not included in the analysis of gross sales.

Table 2. Top ten pharmacies (left – out of 57) and major product types (right) involved in void transactions.

Pharmacy Name	State	Total # of Void Transactions
GNP PHARMACY #680	PA	813
GNP PHARMACY #196	PA	703
GNP PHARMACY #18	NJ	396
GNP PHARMACY #914	PA	297
GNP PHARMACY #75	PA	278
GNP PHARMACY #588	CT	228
GNP PHARMACY #198	PA	212
GNP PHARMACY #499	NY	183
GNP PHARMACY #451	PA	177
GNP PHARMACY #458	PA	174

Product Description	Total
VITAMINS/DIETARY SUPPLEMENTS	713
HOME HEALTH CARE	429
GREETING CARDS & OTHER ASSOCIATED MANUFACTURER ITEMS	399
CONFECTIONS	197
MISC GENERAL MERCHANDISE	196
DIABETES CARE	176
FIRST AID	172
SKIN CARE	134
HOUSEHOLD PRODUCTS	119
FOOD & BEVERAGES	106

A small group of POS transactions possessed positive values for sales price and negative values for sales quantity. This situation infers that cash was received by the vendor but the product/service was returned to inventory and was not ultimately received by the customer. These transactions have an ambiguous meaning and were thus not included in the gross sales analysis. Fortunately, the number of transactions that fell within this 'other' category was small (624 or 0.07% of total) and the exclusion of this data from the gross sales analysis will thus not be impactful. An analysis of these 'other' transactions as a function of pharmacy location or product type was conducted to gain further insight. It was determined that these 'other' transactions consisted of a variety of products sold by a small group of pharmacies that are centrally located in the New York/New Jersey area (Table 3). Over half of these transactions occurred at one specific pharmacy (#200) and suggest that data entry errors and/or equipment malfunctions are likely at fault. It is thus suggested that training practices and POS equipment at these locations be reviewed to improve the accuracy of data entry.

Table 3. Locations (left) and top 10 products (right) attributable to transactions denoted as 'Other'.

Pharmacy Name	State	Frequency
GNP PHARMACY #200	NY	329
GNP PHARMACY #232	NJ	101
GNP PHARMACY #300	NJ	94
GNP PHARMACY #307	NJ	42
GNP PHARMACY #361	NJ	33
GNP PHARMACY #7	NJ	13
GNP PHARMACY #448	NJ	11
GNP PHARMACY #146	ME	1

Category Description	Total
HOME HEALTH CARE	189
COMPRESSION SUPPORT	145
SEASONAL PRODUCTS	125
HEALTH SUPPORTS	70
VITAMINS/DIETARY SUPPLEMENTS	49
FOOT CARE	29
FIRST AID	23
PHOTOGRAPHY	22
DIABETES CARE	13

Methodological Summary. In order to derive gross sales transaction data, the POS_TRANS data frame was modified to provide gross sales attribute calculated as the product of the EXT_SLS_AMT and SLS_QTY attribute. Using various functions in the dplyr, DBI libraries and standard SQL queries within the RStudio environment, the aggregate gross sales of each individual pharmacy was then determined on a monthly basis. These values were then utilized to determine the mean and median monthly gross sales on a store basis. Finally, the average monthly gross sales on a per store basis was filtered to determine those pharmacies in the top and bottom 10^{th} percentile for performance.

Gross Sales Analysis. For the purposes of this business capability analysis, the gross sales attributable to a specific transaction were calculated as the product of sales price (EXT_SLS_AMT) and sales quantity (SLS_QTY) for those transactions having positive values for these two attributes. Specifically, the POS transaction registry was filtered for these particular transactions and a gross sale attribute was generated as the product of these two values.

Shown in Figure 2 is a frequency distribution of the values of individual gross sales transactions for the entirety of the ABC Pharmacy chain during the first six months of 2016. During this reporting period the mean and median transaction value for all stores was $18.97 and $5.25, respectively. Disparate mean and median transaction values are indicative of a right skewed distribution, where most individual gross sales transactions are low in value with a small population of high value transactions in excess of $100.

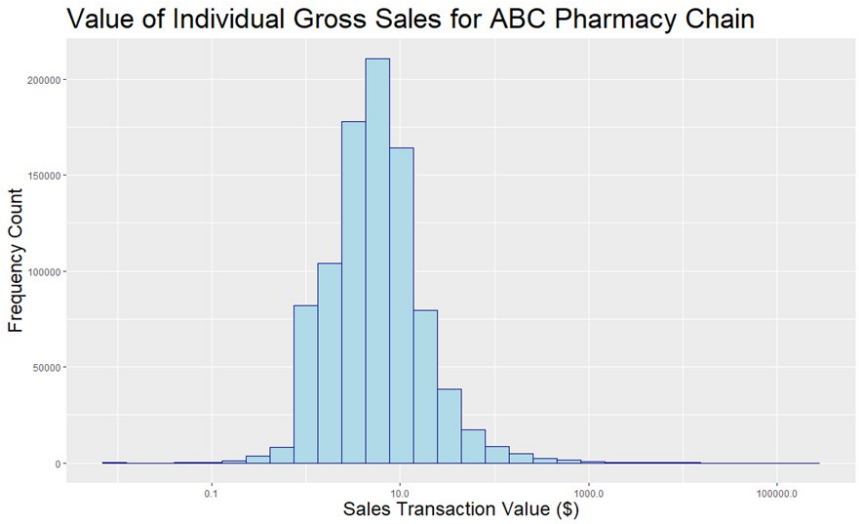


Figure 2. Frequency distribution of the value of individual gross sales transactions for the ABC Pharmacy chain during the first six months of 2016.

The presence of a severe right skew in the sales data may present the possibility that any sales analysis could be confounded and/or dominated by just a few very high value transactions. To probe for this possibility, the specific products responsible for a total gross sales of more than $200,000 during the first six months of 2016 were determined (Table 4). These high value transactions were attributed to a variety of products ranging from lottery to money orders. Further data analysis revealed that money order transactions accounting for a total of ~$1.6M of total gross sales over this six-month period originated mainly from one store within the ABC pharmacy chain (GNP Pharmacy #453, CT). This anomalously large total transaction value attributable to one pharmacy from one product type should be taken into consideration during this gross sales analysis.

Table 4. Specific products having a total gross sale in excess of $200,000.

Product Description	# of Transactions	Total Sales	Average Price	PercentOfGross
MONEY ORDER	5473	$ 1,661,996	$ 304	9.7
JOBST 119511	11046	$ 1,470,524	$ 133	8.5
VITAMINS/SUPPLEMENTS	18670	$ 755,289	$ 40	4.4
STRUTZ PRO	2375	$ 746,501	$ 314	4.3
LOTTO	5114	$ 479,160	$ 94	2.8
10 CENT CANDY	14190	$ 475,142	$ 33	2.8
DME SALES	32296	$ 469,581	$ 15	2.7
GIFT CARD VISA $20-$500	2006	$ 426,615	$ 213	2.5
GENERICQS1ITEM	21202	$ 378,387	$ 18	2.2
CARDS	13181	$ 354,217	$ 27	2.1
DME	14572	$ 280,762	$ 19	1.6
MONEYGRAM	1276	$ 261,745	$ 205	1.5
BALLOONS	1034	$ 244,009	$ 236	1.4

It is also important to note that the gross sales transactions recorded in the POS database originated from only 106 unique stores within the ABC Pharmacy chain. With a total of 1097 stores, the gross sales reported in the POS registry thus represent just a small sampling of the entirety of the ABC Pharmacy chain. In order to derive maximum value from the following gross sales analysis it is prudent that any sampling of POS transactions be representative of the entirety chain. Selective or convenience sampling of POS transaction data may ultimately impede the ability to generalize the results of this gross sales analysis to the entire chain of ABC pharmacies.

Shown in Figure 3 is a geographic breakdown of the percentage of ABC pharmacies within each state. The data is grouped by stores solely reporting sales and all stores in the entirety of the ABC Pharmacy chain. Representative sampling on a geographic basis should ultimately lead to a similar breakdown in both groups, but this is unfortunately not the case for this particular dataset. The group of pharmacies solely reporting POS transactions is overweighted by stores in Pennsylvania and underweighted by stores in New York. Because the sample of stores is not entirely representative on a geographical basis, it is prudent to avoid an over-generalization of the following gross sales analysis. Instead, the results for this analysis should be considered as solely indicative of the group of pharmacies reporting sales only.

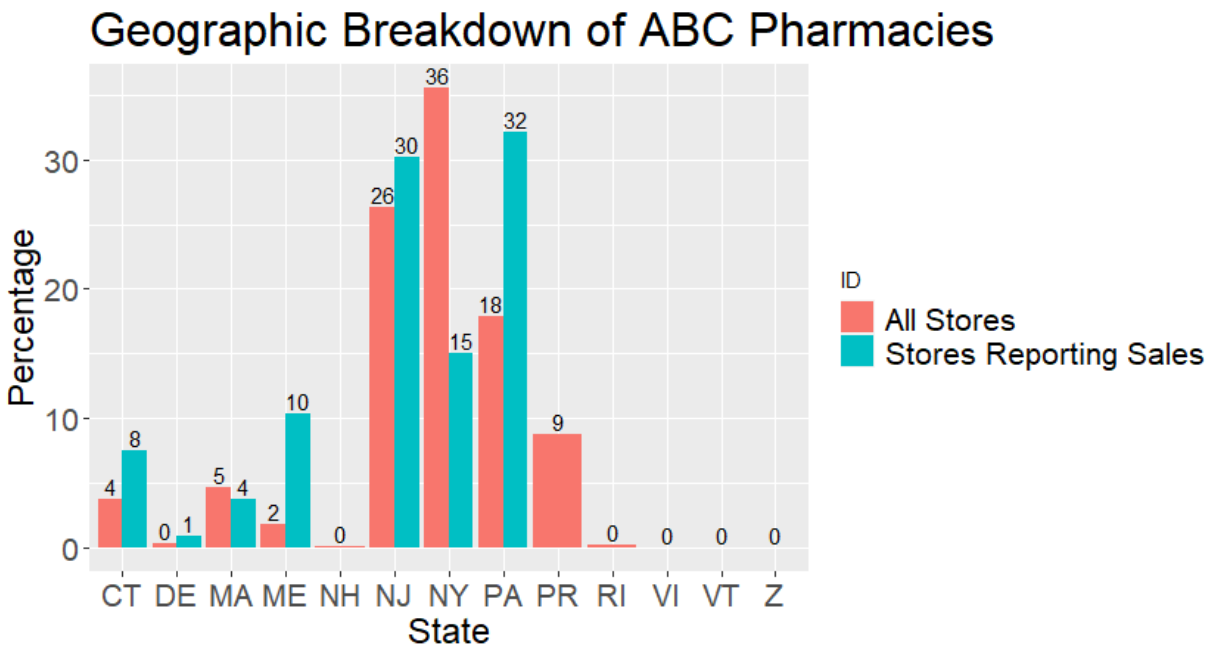


Figure 3. Geographic breakdown of ABC stores

Results. The following gross sales analysis of the ABC pharmacy chain is primarily intended to not only ascertain the health of the business, but to identify those pharmacies (or groups of pharmacies) that are clearly over- or under-performing with respect to revenue generation. Upon identification of these key stores, further analysis will probe for possible reasons behind aberrant performance and to identify opportunities for further improvement or investment. Of interest, is the identification of certain geographical areas that are overperforming in geographic markets that are not fully served. These geographic markets could ultimately be targeted for additional store expansion, capturing more of an addressable market for ABC Pharmacy chain. Similarly, those geographic markets that consistently underperform are locations where store consolidation may be warranted. Elimination of those stores that consistently underperform will decrease overhead/operating expenses, reduce potential franchise cannibalization and ultimately improve profitability for the ABC Pharmacy Chain.

Table 5. Median/mean monthly store sales and total gross sales for the ABC Pharmacy chain.

Month	Median Store Sales	Mean Store Sales	Total Gross Sales	# of Stores
Jan	$ 8,770	$ 32,777	$ 3,015,511	92
Feb	$ 8,921	$ 29,210	$ 2,891,780	99
Mar	$ 9,475	$ 37,756	$ 3,700,045	98
Apr	$ 8,527	$ 23,395	$ 2,292,713	98
May	$ 9,266	$ 25,112	$ 2,511,184	100
Jun	$ 9,433	$ 27,069	$ 2,788,057	103

For the purposes of this data analysis, gross sales are defined as the total value of transactions during a certain time period. Through analysis of the relevant POS transactions, the total gross sales, monthly mean store and monthly median store gross sales was determined for the ABC pharmacy chain (Table 5). The total gross sales on a monthly basis affords a measure of the health of the entire ABC pharmacy business, whereas the monthly median (or mean) store gross sales represent the typical performance of an individual store. In this case the monthly median store gross sales figure is fairly low relative to mean values, indicating that the majority of stores exhibit low monthly gross sales with a small fraction of stores exhibiting relatively high sales (i.e. high performers). This data clearly indicates that the ABC pharmacy chain could benefit tremendously from the consolidation and elimination of those stores that are underperforming, which could be an appreciable quantity based upon this analysis.

Table 6. List of pharmacies exhibiting average monthly gross sales above the 90th percentile

AverageMonthlySales	PHRMCY_NAM	ST_CD	ZIP_3_CD
$ 567,088	GNP PHARMACY #680	PA	170
$ 352,230	GNP PHARMACY #453	CT	65
$ 293,548	GNP PHARMACY #200	NY	110
$ 238,709	GNP PHARMACY #269	NJ	77
$ 164,220	GNP PHARMACY #110	NY	101
$ 103,535	GNP PHARMACY #795	NJ	77
$ 95,253	GNP PHARMACY #232	NJ	77
$ 86,062	GNP PHARMACY #18	NJ	87
$ 78,505	GNP PHARMACY #739	NJ	76
$ 67,562	GNP PHARMACY #798	PA	180
$ 65,449	GNP PHARMACY #990	MA	25

High Performing Stores. In order to elucidate reasons and/or defining characteristics for stores that over perform with respect to gross sales, the data analysis endeavored to identify those stores with average monthly gross sales above the 90th percentile. Specifically, average monthly gross sales were aggregated by pharmacy number and then filtered for those values above the 90th percentile. A list of these high performing pharmacies is shown in (Table 6) and is dominated mainly by stores in the tristate metro area. Most notable is store #680, which exhibited a remarkably high average gross sales figure. Also present in this list is store #453, a pharmacy in the New Haven area that recorded a total of $1.6M in revenue over a six-month period solely from money order transactions.

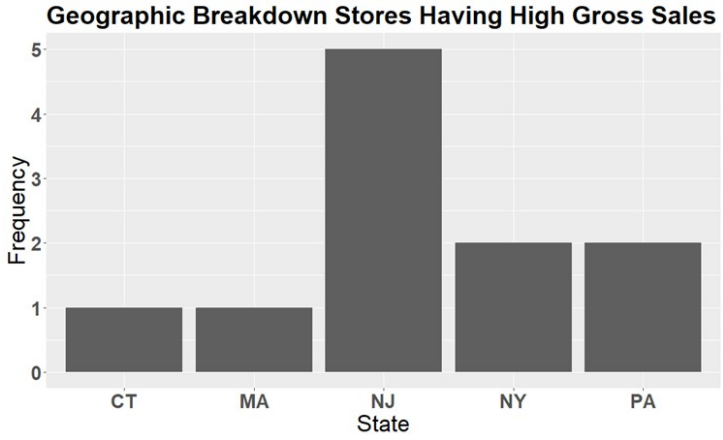


Figure 4. Geographic breakdown of stores exhibiting average monthly gross sales above the 90th percentile

In order to discern any common characteristics amongst those stores with high average monthly gross sales, the database was mined to determine those products that these stores sold most frequently. Shown in Error: Reference source not found is the top ten items by frequency sold by these high performing stores during the six-month reporting period. Products common to these stores are consumables, greeting cards and vitamins/supplements. Due to the increased frequency of transactions related to these products it is recommended that these stores implement sound practices to ensure consistent in-stock inventory of these particular items.

Table 7. Top ten items (by frequency) sold by pharmacies with high average monthly gross sales.

Description	Frequency
GREETING CARDS & OTHER ASSOCIATED MANUFACTURER ITEMS	72787
FOOD & BEVERAGES	27660
CONFECTIONS	25153
MISC GENERAL MERCHANDISE	18096
VITAMINS/DIETARY SUPPLEMENTS	15372
HOME HEALTH CARE	13879
TOBACCO	13549
FIRST AID	12534
ORAL CARE	9488
SKIN CARE	8007

The identification of these high performing stores also presents a potential opportunity for further investment and the construction of additional stores. High revenue generating stores could be situated in geographic locations that are largely underserved. They may thus indicate geographic markets that are ripe for further investment. To identify these opportunities, a data analysis was conducted to determine the relationship between average monthly gross sales and store density for these high performing pharmacies (Figure 5). For the purposes of this analysis, store density was calculated as the number of stores located in a particular Zip 3 code, which serves as a reasonable surrogate for land area within the geographic region studied [[1]]. The relationship between these two variables is moderately negative, indicating that as store density increases, gross sales generally decrease. This relationship suggests that market cannibalization of closely located stores should be a concern for the ABC Pharmacy chain. The areas of opportunity are clearly indicated by those pharmacies that deviate significantly from this relationship, particularly those pharmacies that are generating high gross sales in areas with relatively low store density. These stores are clearly overperforming in markets due likely to high demand and significant foot traffic. These strong geographic markets are clearly opportunities for further expansion for the ABC Pharmacy Chain.

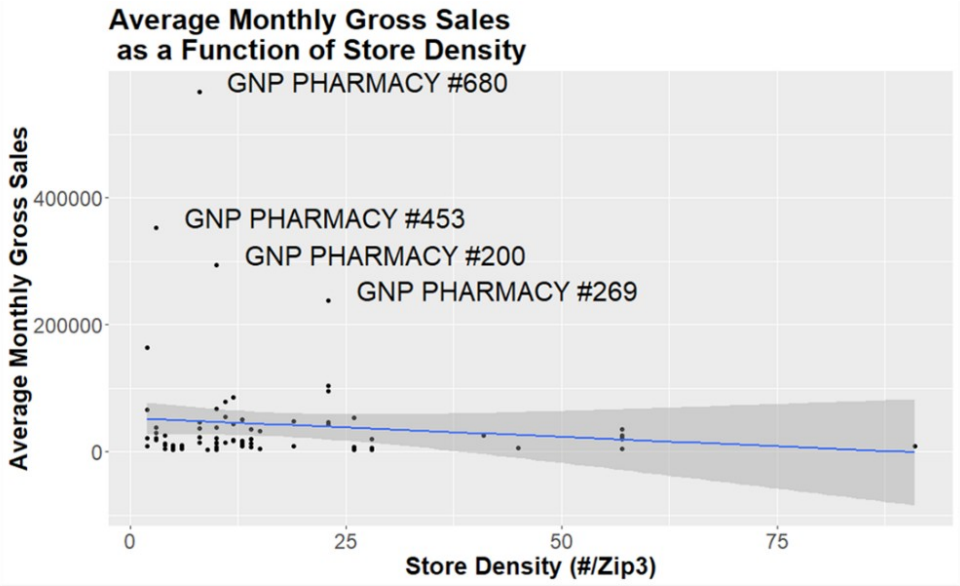


Figure 5. Relationship between average monthly gross sales and store density for high performing stores.

The opportunities for potential further investment are detailed in Table 8 which identify the specific geographic areas where high performing stores are operating with relatively low store density. Generally, these areas appear to correspond largely to population density, with a notable exception of Store #269 operating in the Red Bank, NJ area. Overall, it is recommended that the ABC pharmacy chain should consider further studies to determine whether expansion into these particular geographic areas is financially sound.

Table 8. A detailed list of high performing stores in areas with low store density

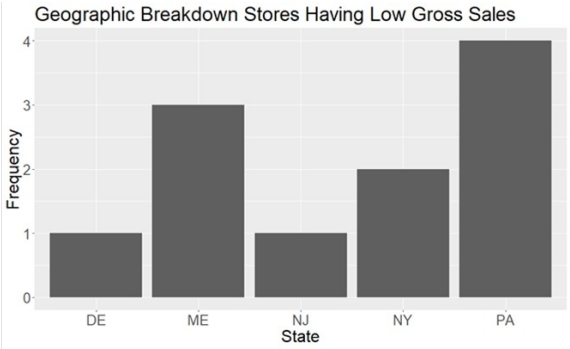
AverageMonthlySales	PHRMCY_NAM	ZIP_3_CD	ST_CD	City/Area	StoreDensity
$ 567,088	GNP PHARMACY #680	170	PA	Harrisburg	8
$ 352,230	GNP PHARMACY #453	65	CT	New Haven	3
$ 293,548	GNP PHARMACY #200	110	NY	Queens	10
$ 238,709	GNP PHARMACY #269	77	NJ	Red Bank	23

Poorly Performing Stores. An analysis of gross sales was also conducted to identify those stores exhibiting average monthly gross sales in the lower 10% of the store population. Specifically, the average monthly gross sales were aggregated by pharmacy number and then filtered for performance below the 10th

percentile. A list of these poorly performing pharmacies is shown in Table 9 and is dominated mainly by stores in more rural and less populated areas. Interestingly, some of these stores are clustered in the states of Pennsylvania and Maine, which may represent potential areas for store closing/consolidation.

Table 9. List (left) and geographic breakdown (right) of those pharmacies exhibiting average monthly gross sales below the 10th percentile

AverageMonthlySales	Store Name	State	City/Area	Zip 3 Code
$ 1,276	GNP PHARMACY #196	PA	Reading	196
$ 1,175	GNP PHARMACY #297	DE	Dover	199
$ 1,052	GNP PHARMACY #942	ME	Bangor	44
$ 800	GNP PHARMACY #800	ME	Ellsworth	46
$ 550	GNP PHARMACY #1053	ME	Waterville	49
$ 420	GNP PHARMACY #458	PA	Reading	196
$ 179	GNP PHARMACY #881	NY	Poughkeepsie	125
$ 102	GNP PHARMACY #835	NY	Brooklyn	112
$ 43	GNP PHARMACY #211	NJ	Dover	78
$ 38	GNP PHARMACY #116	PA	Philadelphia	191
$ 25	GNP PHARMACY #150	PA	Philadelphia	191



As indicated above, the poor gross sales performance in for these stores could likely driven by low population density, but it could also be due to the fact these stores are operating in areas with vastly different demographics. Shown in Table 10 is a list of the top ten most frequently sold products for these underperforming stores. Similar to the products sold by high performing stores, this list contains consumables such as candy and beverages. It does differ markedly however, by the domination of transactions related to the purchase of products within the home health care category. Products within the home health category include wheelchairs, walking aids, and catheters, products that are frequently used by an aging demographic. It is thus likely that gross sales improvement is possible within these areas is by catering products and services to an older population and implementing a targeted product segmentation strategy. Improving in-store accessibility and providing online sales and pickup may also be one strategy to drawn in more older customers. These stores could also specialize in providing products specifically catered to seniors such as pain relief, walking aids and supplements. By catering specifically to this aging demographic, the ABC pharmacy chain could significant improve gross sales at those underperforming stores operating in more rural areas.

Table 10. A list of the top 10 most frequently sold products for underperforming ABC stores.

Description	Frequency
HOME HEALTH CARE	1009
VITAMINS/DIETARY SUPPLEMENTS	341
FIRST AID	159
FOOD & BEVERAGES	155
CONFECTIONS	93
ORAL CARE	78
EYE & EAR CARE	73
DIABETES CARE	33
SHAVING & GROOMING	32
FOOT CARE	31

Shown in Figure 6 is a linear regression of the average monthly gross sales as a function of store density for those ABC Pharmacy stores exhibiting poor monthly gross sales. The relationship is weakly negative but is consistent with notion that sales tend to suffer as store density increases. Pharmacies that are underperforming in areas with high store density may indicate that these geographic areas are significantly oversaturated with stores. This situation is indicative of a small market addressed by too many stores and indicates that ABC Pharmacy may be well served in shutting down and consolidating operations in select areas.

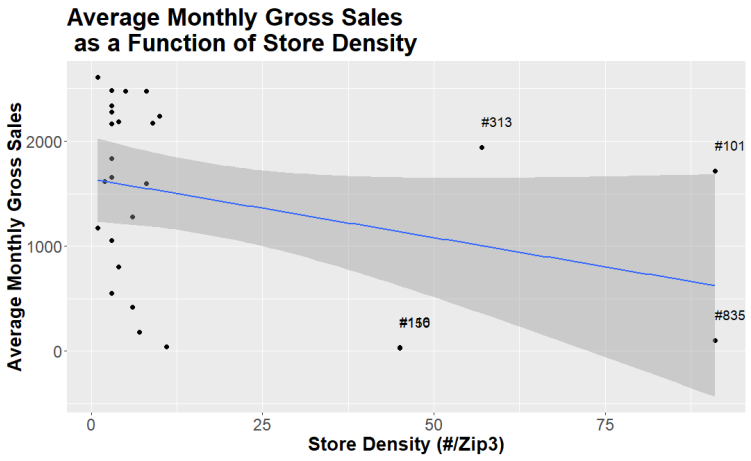


Figure 6. Relationship between average monthly gross sales and store density for those ABC Pharmacy stores exhibiting lower than typical gross sales performance.

Stores that are candidates for consolidation are listed specifically in Table 11, which details those underperforming stores operating in areas that have a store density in excess of fifteen. Interestingly, these stores are located primarily in urban areas with high population density based upon their respective Zip 3 codes. The lack of performance in these stores is thus highly unlikely to be related to a small customer base. Urban areas also tend to have a more diverse demographic [2], indicating that poor performance in these stores is likely not solely related to the emergence of an underserved aging demographic. It thus stands to reason, that the main driver for poor performance in these cases is high store density and market cannibalization. The ABC Pharmacy chain would thus be well served to shut down and consolidate these specific operations in these urban areas. This action will improve profitability by decreasing overhead and operating expenses and will help to drive more customers those stores still operating in these areas.

Table 11. Underperforming ABC Pharmacy stores operating in areas with high store density.

AverageMonthlySales	Pharmacy Name	Zip 3	State	City/Area	Store Density (#/Zip3)
$ 1,942	GNP PHARMACY #313	70	NJ	Newark	57
$ 1,714	GNP PHARMACY #1018	112	NY	Brooklyn	91
$ 102	GNP PHARMACY #835	112	NY	Brooklyn	91
$ 38	GNP PHARMACY #116	191	PA	Philadelphia	45
$ 25	GNP PHARMACY #150	191	PA	Philadelphia	45

Conclusions and Recommendations.

The preceding gross sales analysis successfully leveraged key POS transaction data to identify groups of pharmacies within the ABC Pharmacy chain that over- and under-perform with respect to monthly gross sales. A comprehensive analysis of those pharmacies that underperform revealed that a revised product segmentation strategy catered specifically to an aging demographic should be utilized to boost sales in certain rural areas. The analysis also identified a few underperforming stores in urban areas that should be considered as targets for closing and consolidation. Finally, the analysis also utilized gross sales data to identify geographic areas with a under served market and identified geographic areas that are ripe for

further investment. By following the recommendations derived from this analysis, the client, ABC Pharmacy, will significantly improve overall gross sales and profitability.

[1] https://www.census.gov/programs-surveys/geography/technical-documentation/records-layout/2010-zcta-record-layout.html
[2] https://www.pewsocialtrends.org/2018/05/22/demographic-and-economic-trends-in-urban-suburban-and-rural-communities/