Characteristics of Mail-Order Pharmacy Users: Results From the Medical Expenditures Panel Survey

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Abstract
Background: There is a paucity of research on the population characteristics of mail-order pharmacy users. **Objective:** This study utilized a nationally representative sample to examine the characteristics of mail-order pharmacy users. **Methods:** This study used data from the 2012 Medical Expenditure Panel Survey (MEPS). The outcome variable was defined as whether the participant had used a mail-order pharmacy during the study year. Logistic regression was conducted to determine the factors which influence mail-order pharmacy use. All analyses incorporated MEPS sampling weights to adjust for the complex survey design. **Results:** Among the 14,106 adults included, approximately 18% of them had used a mail-order pharmacy at least once to fill their prescription in 2012. Compared to community pharmacy users, mail-order pharmacy users were more likely to be white, older, married, have a higher family income, a higher educational level, have health insurance, and have a prescription with at least a 30-day supply. There is no difference in gender or urban/rural disparity. In addition, mail-order pharmacy users had a lower percentage of out-of-pocket costs. **Conclusion:** Mail-order pharmacy use was significantly associated with certain patient characteristics. Policymakers should consider these characteristics when promoting mail-order pharmacy use.

Introduction

Mail-order pharmacies, which deliver medications directly to patients' residence by mail, have certain noticeable benefits, compared to community pharmacies (also known as retail pharmacies). Mail-order pharmacies spare patients the need of a trip to community pharmacies to fill prescriptions, which is especially convenient for patients who live far away from a local pharmacy or have difficulty making the trip. Studies show that using mail-order pharmacies results in higher medication adherence rate compared to retail pharmacies.[1-3] Studies have consistently demonstrated that better medication adherence leads to better health outcomes[4,5]; thus, the use of mail-order pharmacies may improve health by increasing the medication adherence rate, as evidenced in the study by Schmittdiel et al.[6]

Mail-order pharmacies may lower dispensing costs due to their high volume and highly automated operations.[7] Though the unit price for a given drug is usually lower for mail-order pharmacies, studies often find no overall savings on medication, with sometimes even higher medication cost, due to higher medication possession rate from better medication adherence.[1,7,8] Interestingly, since better medication adherence is associated with better health outcomes, the overall health-care costs, including medication costs, inpatient costs, and outpatient costs, are found to be lower for mail-order pharmacy users.[1] The various benefits justify the promotion of mail-order pharmacy use by health insurers and pharmacy benefit managers, which are companies that manage the drug benefits for health insurers.

However, there are also various concerns with mail-order pharmacies, such as possible loss of medication during the shipping and delivery process and possible contamination during transportation or receiving the wrong medication.[9] Those concerns do not go away easily and have led to patients' resistance to drug policies that mandate the use of mail-order pharmacies.[9]

Because of its pros and cons, the use of mail-order pharmacies experienced a dramatic growth in the beginning and then plateaued in recent years. In the 1990s to early 2000s, the market share of mail-order pharmacies in the outpatient prescription drug market had expanded greatly, increasing from 6% in 1989 to 12% in 2000.[9,10] However, the market share of mail-order pharmacies has experienced very limited growth

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since 2006,[11] even dropping from 16.7% in 2012 to 15.2% in 2013.[12]

With the aging of the population, more prescription drugs will be needed, especially long-duration maintenance drugs for chronic diseases, which are ideal types of medication for the use of mail-order pharmacies. Studies on the characteristics of mail-order pharmacy users can inform policy makers to design related policies and help predict the future trend of mail-order pharmacy use.

In the literature, there is a paucity of research on patient characteristics of mail-order pharmacy users. A recent study on diabetic patients has identified some socioeconomic factors associated with mail-order pharmacy use.[8] Another study on patients who newly started the use of statin medications has explored the patient characteristics of mail-order pharmacy users.[6] Those studies focused on only particular patient groups with a specific disease or using a specific medicine. Rashrash et al explored the patient characteristics of mail-order pharmacy users for the general population; however, their study relied on self-reported data from Internet-based online surveys with electronic invitations for participation. The potential self-selection bias and recall bias were well recognized by the authors in the paper.[13]

This study aims to identify patient characteristics of mail-order pharmacy users versus community pharmacy users in the general US population using the Medical Expenditure Panel Survey (MEPS) data. The MEPS data used in this study are nationally representative data collected from well-designed national interviews, verified by rigorous methods and other data sources, and conducted annually for more than 2 decades by the Agency for Healthcare Research and Quality (AHRQ) of the US Department of Health & Human Services.[14] This study used deidentified public use MEPS data, which are available for download free of charge at the AHRQ web site.[14]

Methods

Data Source

The data used in this study were from the 2012 MEPS.[14] The respondents for MEPS are drawn from participants in the previous year's National Health Interview Survey.[15] The MEPS database provides a valuable source for studying various patterns of prescription drug use.[16] The MEPS data files used in this study included (1) the full-year consolidated data file, containing patient-level information on socioeconomic variables, health conditions, and health insurance and (2) the prescription drug use data file with information for each filled prescription such as the drug name, drug dispensing channel, and payment.

Study Population

Participants 18 years and older in MEPS were included in this study, who (1) had a positive person-level weight, indicating the participant successfully completed the MEPS interviews, and (2) had at least 1 prescription filled either from a mail-order pharmacy or community pharmacy. Children younger than 18

years were excluded because they were less likely to make their own pharmacy choice.

Outcome Variables

The medication dispensing channel was determined using the variable "type of pharmacy" in the MEPS prescribed medication file. Respondents in the survey were asked to report the pharmacy type from which they purchased their prescription drugs. They were allowed to list multiple possible pharmacies associated with their prescriptions including (1) mail-order pharmacy, (2) online store, (3) Health Maintenance Organization (HMO), clinic or hospital, (4) drug store, and (5) another store. Participants who exclusively purchased or refilled their prescriptions in HMOs, clinics, or hospitals throughout the year were excluded from this study. Mail-order pharmacy users were defined as those who had one or more prescription filled through a mail-order pharmacy or online store. Community pharmacy users were defined as those who had no prescriptions filled through a mail-order pharmacy or online store throughout the year. A dichotomous variable that indicated whether a participant was a mail-order pharmacy user or community pharmacy user was created.

Independent Variables

Various demographic and socioeconomic variables were considered including age, gender, race/ethnicity, marital status, education, family income level, census region, metropolitan statistical area (MSA) status, and health insurance coverage. Health insurance coverage was a dichotomous variable defined as: insured (covered by health insurance for at least 1 day) or uninsured (not covered by health insurance) during the year 2012.

An indicator variable on whether the person had filled a prescription with at least a 30-day supply was created. Maintenance drugs are more applicable to mail-order pharmacies than short-term acute use medication.

Data Analysis

Data analysis was conducted using SAS version 9.4 (SAS Institute Inc, Cary, North Carolina). *T*-tests and Rao-Scott chi-square tests were employed to assess whether various independent variables were distributed differently between mail-order pharmacy users and community pharmacy users. Logistic regression was conducted to examine the association between mail-order pharmacy use and various independent variables. The statistical significance was evaluated at the $P < .05$ level. All statistical analysis incorporated the MEPS person-level weights, strata, and primary sampling unit information to adjust for the complex survey design.

Results

A total of 14,106 individuals (weighted sample of 148 198 007) were included in this study, and 18.0% of them

Table 1. Weighted Descriptive Statistics.

Variable, P Value	Variable Value[a]	Mail-Order Pharmacy Users[b]	Community Pharmacy Users[b]
Age (years); $P < .0001$	18-45 (36.04%)	8.27%	91.73%
	46-64 (38.30%)	19.01%	80.99%
	$\geq$ 65 (25.66%)	30.05%	69.95%
Gender; $P = .018$*	Men (41.82%)	18.95%	81.05%
	Women (58.18%)	17.27%	82.73%
Race/ethnicity; $P < .0001$*	Non-Hispanic white (73.34%)	20.56%	79.44%
	Non-Hispanic black (10.40%)	11.10%	88.90%
	Hispanic (10.58%)	8.12%	91.88%
	Asian (3.62%)	15.66%	84.34%
	Other (2.07%)	15.23%	84.77%
Marital status; $P < .0001$*	Married (55.75%)	21.55%	78.45%
	Not married (44.25%)	13.46%	86.54%
Family income level $P < .0001$*	Low income (29.57%)	9.48%	90.52%
	Middle income (29.39%)	17.50%	82.50%
	High income (41.05%)	24.43%	75.57%
Educational attainment; $P < .0001$*	High school or less (41.37%)	15.02%	84.98%
	Beyond high school (28.34%)	17.57%	82.43%
	College or more (30.29%)	22.37%	77.63%
Census region; $P = .057$	Northeast (18.97%)	20.86%	79.14%
	Midwest (23.36%)	16.87%	83.13%
	South (37.67%)	17.67%	82.33%
	West (20.00%)	17.09%	82.91%
Residence; $P = .410$	Non-MSA (15.76%)	17.09%	82.91%
	MSA (84.24%)	18.14%	81.86%
Health insurance; $P < .0001$*	Yes (91.83%)	19.12%	80.88%
	No (8.17%)	5.00%	95.00%
Prescription $\geq$ 30 days; $P < .0001$*	Yes (67.32%)	22.30%	77.70%
	No (32.68%)	9.04%	90.96%

Abbreviation: MSA, metropolitan statistical area.

[a]The percentages in the column under "Variable Value" are the distribution of the variable values among all participants. Those percentages add up to 100% within the same variable, such as for age, 36.04% + 38.30% + 25.66% = 100%.

[b]The percentages in the last 2 columns are the distribution of the drug dispensing channel at a given variable value. Those percentages add up to 100% at a given categorical value of a variable, such as for age 18-45 years, 8.27% + 91.73% = 100%.

*Indicate statistical significance.

had used a mail-order pharmacy at least once to fill their prescriptions during 2012.

Table 1 presented the weighted descriptive characteristics for the overall sample and the subgroups of mail-order pharmacy versus community pharmacy users. Mail-order pharmacy users and community pharmacy users were significantly different in age ($P < .0001$). In this study, 36.04% of the respondents were 18 to 45 years old, among whom only 8.27% had used mail-order pharmacies, whereas as high as 30.05% of seniors aged 65 or more had used mail-order pharmacies. The use of pharmacy channel differed significantly by race, with minorities being less likely to use mail-order pharmacy services than whites (8.12% of Hispanics, 11.10% of blacks used mail-order pharmacies compared to 20.56% of whites). A higher percentage of married people used mail-order pharmacies than unmarried people (21.55% vs 13.46%, $P < .0001$). People with higher income were more likely to be mail-order pharmacy users (from 9.48% for lower income to 17.50% for middle income and 24.43% for high income, $P < .0001$). The percentage of

mail-order pharmacy users increased with educational attainment ($P < .0001$). Those living in an MSA did not differ from those in non-MSA areas regarding their tendency to use mail-order pharmacies (17.09% for non-MSA vs 18.14% for MSA, $P = .41$). A much higher percentage of insured people used mail-order pharmacies compared to uninsured people (19.12% vs 5.00%, $P < .0001$). Having a prescription of at least a 30-day supply dramatically increased the chance of using mail-order pharmacies (9.04% vs 22.30%, $P < .0001$).

Table 2 summarized the logistic regression results, with the binary-dependent variable being the use of a mail-order pharmacy or not. The unadjusted odds ratios were from simple logistic regression models with the single covariate under study, and the adjusted odds ratios were from the logistic regression with all the covariates included. The P value associated with a given level of a categorical variable was for testing whether that given level had a statistically significant effect compared to the reference level, based on likelihood ratio test.

Table 2. Odds Ratio for Logistic Regression on the Use of a Mail-Order Pharmacy.

Variable	Variable Value	Unadjusted Odds Ratio,[a] P Value[c]	Adjusted Odds Ratio,[b] P Value
Age (years)	18-45	1.00	1.00
	46-64	2.60 (2.18, 3.11), $P < .0001$[c]*	1.96 (1.64, 2.34), $P < .0001$[c]*
	≥65	4.77 (3.95, 5.75), $P < .0001$*	3.72 (3.06, 4.51), $P < .0001$*
Gender	Men	1.00	1.00
	Women	0.89 (0.81, 0.98), $P = .02$*	1.06 (0.96, 1.18), $P = .24$
Race/ethnicity	Non-Hispanic white	1.00	1.00
	Non-Hispanic black	0.48 (0.40, 0.58), $P < .0001$*	0.65 (0.54, 0.79), $P < .0001$*
	Hispanic	0.34 (0.27, 0.43), $P < .0001$*	0.54 (0.43, 0.68), $P < .0001$*
	Asian	0.72 (0.56, 0.92), $P = .01$*	0.83 (0.64, 1.07), $P = .15$
	Other	0.69 (0.44, 1.10), $P = .12$	0.82 (0.50, 1.36), $P = .44$
Marital status	No	1.00	1.00
	Yes	1.77 (1.54, 2.02), $P < .0001$*	1.30 (1.12, 1.55), $P = .0005$*
Family income level	Low income	1.00	1.00
	Middle income	2.02 (1.67, 2.45), $P < .0001$*	1.95 (1.61, 2.36), $P < .0001$*
	High income	3.09 (2.66, 3.58), $P < .0001$*	2.54 (2.16, 2.99), $P < .0001$*
Educational attainment	High school or less	1.00	1.00
	Beyond high school	1.21 (1.03, 1.41), $P = .02$*	1.20 (1.02, 1.42), $P = .03$*
	College or more	1.63 (1.42, 1.88), $P < .0001$*	1.32 (1.12, 1.55), $P = .001$*
Census region	West	1.00	1.00
	Northeast	1.28 (1.03, 1.58), $P = .02$*	1.27 (1.03, 1.56), $P = .02$*
	Midwest	0.98 (0.80, 1.21), $P = .88$	0.88 (0.71, 1.09), $P = .23$
	South	1.04 (0.87, 1.25), $P = .66$	1.04 (0.86, 1.25), $P = .69$
Residence	Non-MSA	1.00	1.00
	MSA	1.08 (0.86, 1.34), $P = .52$	1.11 (0.90, 1.38), $P = .33$
Health insurance	Yes	1.00	1.00
	No	4.49 (3.08, 6.55), $P < .0001$*	2.28 (1.55, 3.36), $P < .0001$*
Prescription ≥30 days	Yes	1.00	1.00
	No	2.89 (2.50, 3.34), $P < .0001$*	2.49 (2.12, 2.92), $P < .0001$*

Abbreviation: MSA, metropolitan statistical area.
[a]The unadjusted odds ratios are from simple logistic regression involving a single given covariate variable.
[b]The adjusted odds ratios are from logistic regression involving all the covariates.
[c]The P value associated with a given category of a categorical variable is for testing whether that given category of the categorical variable has a statistically significant effect compared to the reference category.
*Indicate statistical significance.

The unadjusted logistic regression results are presented in Table 2. Binary explanatory variables that significantly increased the likelihood of using a mail-order pharmacy included being male ($P = .02$), being married ($P < .0001$), having insurance ($P < .0001$), and having a prescription of at least a 30-day supply ($P < .0001$), based on their respective simple logistic regression models. MSA was not a significant factor ($P = .52$).

In adjusted analysis, compared to the reference group of 18 to 45 years of age, those who were 46 to 64 years were more likely to use mail-order pharmacies ($P < .0001$), with an odds ratio (OR) of 1.96, and those aged 65 years or more were even more likely to use mail-order pharmacies (OR = 3.72, $P < .0001$). Compared to non-Hispanic whites, non-Hispanic blacks (OR = 0.65, $P < .0001$) and Hispanics (OR = 0.54, $P < .0001$) were much less likely to use mail-order pharmacies, while Asians had no statistically significant difference (OR = 0.83, $P = .15$). Married people were more likely to use mail-order pharmacies (OR = 1.30, $P = .0005$). The higher family income level, the

more likely the respondent would use mail-order pharmacies (OR = 1.95 for middle income compared with low income level, $P < .0001$; and OR = 2.54 for high income, $P < .0001$). Likewise, the higher the educational attainment level, the more likely one would use mail-order pharmacies. Having insurance significantly increased the likelihood of using mail-order pharmacies (OR = 2.28, $P < .0001$). Having a prescription with at least a 30-day supply was significantly associated with the use of mail-order pharmacies (OR = 2.49, $P < .0001$).

As in the simple logistic regression, living in an MSA area was not a determinant of mail-order pharmacy use (OR = 1.11, $P = .33$) in logistic regression involving multiple covariates. Most of the variables in Table 2 which were significant in their respective simple logistic regression remained significant in the multiple logistic regression model.

An additional analysis was conducted to compare between mail-order and community pharmacy users the out-of-pocket costs as a ratio of total prescription costs. Based on 2012 prescribed medicine data, the out-of-pocket costs were 16.8% for

mail-order pharmacy users and 18.9% for community pharmacy users.

Discussion

This study found that 18% of people had used a mail-order pharmacy at least once in 2012, meaning that a predominant majority of people had not used any mail-order pharmacy whatsoever. This mail-order pharmacy use rate was close to the estimated 17% found by Rashrash et al.[13] Even among respondents with a prescription of at least a 30-day supply, who were ideal candidates for using mail-order pharmacies, our study found that the percentage of mail-order pharmacy users was just 22.3%. With the low percentage of mail-order pharmacy users, it is no wonder that the market share of mail-order pharmacies in overall drug market was similarly modest at 16.7%.[12] To promote the use of mail-order pharmacies, pharmacy benefit managers should identify effective ways to introduce more first-time users to mail-order services.

Various demographic variables contributed to the use of mail-order pharmacies. Senior people were more likely to utilize mail-order pharmacies, since they tended to use more prescription drugs, especially more maintenance drugs.[17,18] Similar pattern of increasing use by age was also found by Wu et al for patients on diabetic medication,[8] by Schmittdiel et al for patients who newly started statins,[6] and by Rashrah et al for the general population.[13]

Though slightly more males used a mail-order pharmacy, this study did not find a statistically significant gender difference. Wu et al reported a nonsignificant higher use of mail-order pharmacies in men,[8] whereas Schmittdiel et al found a marginally lower use in men,[6] and Rashrash et al presented exactly the same use by male and female.[13] Regarding race, this study showed strong evidence that whites had a much higher use of mail-order pharmacies compared to blacks or Hispanics, as found by Wu et al and Schmittdiel et al.[6,8] This racial difference in mail-order pharmacy use may further slow down its growth in the future, as the population becomes racially more diverse. Marriage has a protective health effect, as well-documented in the medical literature.[19,20] Our study found the marriage effect broadened one's methods of filling a prescription medication, as found by Wu et al.[8] The marriage effect was not studied by Schmittdiel et al or Rashrash et al, probably due to lack of such data in their studies.[6,13]

Mail-order pharmacy use may save money for customers by lowering out-of-pocket costs, so it is reasonable to hypothesize that people with lower income are more likely to use mail-order pharmacies due to higher cost sensitivity. However, our current study found that people with lower income actually had lower mail-order pharmacy use. An explanation could be that people with higher income may be more ready to adopt mail-order pharmacy services due to their greater experience with general nonmedication online shopping. Studies suggest that family income is a major determinant of health outcomes,[21-23] and this study identified one possible mechanism: people with higher income may have better medication adherence thanks to the higher rate of mail-order pharmacy use. Similarly, the higher educational level, the more likely one would use mail-order pharmacies. This association may be attributed to less reliance on local pharmacists to get medical information for people with higher education.

The convenience of mail-order pharmacies which spares patients the need for a trip to a local pharmacy has been highlighted as a primary advantage of using mail-order pharmacies.[24] The MEPS data did not have information on the distance to a local pharmacy, so living in an MSA was used as a proxy for rural/urban classification and to provide some sense of the distance to a local pharmacy. The study showed very strong evidence that rural/urban did not influence patients' choice of using mail-order pharmacies. In the study by Schmittdie et al, the average distance to the nearest local pharmacy was 9 miles among mail-order pharmacy users, only 1 mile longer than that for community pharmacy users.[6]

Having no insurance was associated with very low use of mail-order pharmacies, as people with no insurance tended to use less maintenance medication.[25] The uninsured rate was lower in this study than that of the general population. This was because the study sample was restricted to those who had filled a prescription in the study year, and the uninsured were less likely to have filled a prescription.

Regarding the variable of a 30-day supply, a sensitivity analysis was conducted to see whether the results were robust to a 90-day supply, as 90-day supply may provide an even stronger incentive to use mail-order pharmacies. Among those with a prescription of at least a 90-day supply, the percentage of mail-order pharmacy use increased to 34.5%, and the odds ratio was 3.90 ($P < .0001$). The statistical significance of other variables remained the same. Since many prescriptions were filled for a 30-day supply rather than a 90-day supply, an indicator variable of a 30-day supply was created rather than a 90-day supply.

The out-of-pocket costs as a percentage of total medication costs were derived among all the medication used irrespective of the type of pharmacy, since the MEPS data did not contain information about which pharmacy was used for a given prescription. Even with this data limitation, the overall lower percentage of out-of-pocket costs by mail-order pharmacy users still provided some indirect evidence of a lower copayment for mail-order pharmacy users. Lower copayment is a great incentive to use mail-order pharmacies.[26] However, the lower copayment incentive has become less available in recent years. For instance, some states such as New York and Pennsylvania have passed laws to prohibit insurance plans from having differential copays for mail-order pharmacies and community pharmacies.[27,28]

The study has some limitations as below. The MEPS data did not identify which specific prescription drugs were obtained through mail-order pharmacies, so the exact costs related to mail-order pharmacies could not be derived. Also, there were no data on the insurance drug benefit design, so we could not explore how much a respondent's pharmacy choice was influenced by the incentives or requirements of the drug benefits of his/her insurance.

Conclusions

This study has identified several key factors that affected the use of mail-order pharmacies, such as age, race, marital status, income level, education level, insurance status, and having a prescription with at least a 30-day supply. Living in rural areas did not affect the use of mail-order pharmacies. Insurance policy makers should consider those characteristics in promoting the utilization of mail-order pharmacies.

Authors' Note

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