SOCIO-ECONOMIC DETERMINANTS OF PRESCRIPTION ANTIBIOTIC AND MEDICINE USE AND ITS RELATIONSHIP WITH FAMILY MEDICINE

REÇETE EDİLEN ANTİBİYOTİK VE İLAÇ KULLANIMININ SOSYOEKONOMİK BELİRLEYİCİLERİ VE AİLE HEKİMLİĞİ İLE İLİŞKİSİ

Abdullah TİRGİL[1]

1. Dr. Öğr. Üyesi, Ankara Yıldırım Beyazıt Üniversitesi, Siyasal Bilgiler Fakültesi, Maliye Bölümü, atirgil@ybu.edu.tr, https://orcid.org/0000-0002-4491-4459

Abstract

Improper use and over-consumption of antibiotics have direct implications on the health of individuals as well as indirect consequences impacting limited health care budgets of countries. There is scarce evidence on the determinants of medicine and antibiotic consumption for developing nations. We examine the relationship between family medicine and physician-prescribed antibiotic consumption over the years. We use nationally representative Turkey's Health Surveys for the years 2008 through 2012. We employ a multivariate regression analysis by implementing the Ordinary Least Squares method to understand the factors which determine prescribed antibiotic and medicine use. Findings indicate that antibiotic utilization trend declines in 2010 and continue falling in 2012 as well compared to 2008. We also find that visiting family medicine increases the probability of antibiotic utilization, which is inconsistent with the aim of the Health Transformation Program. However, the positive relationship between the family medicine visit and antibiotic use weakened over the years. Although Turkey took several measures and succeeded to reduce antibacterial resistance to some extent, antibiotics are still the most resorted drug type among therapeutic groups.

Keywords: Prescribed Antibiotics Utilization, Prescribed Medicine Utilization, Family Medicine, Socio-Economic Determinants

Abstract

Yanlış ve aşırı antibiyotik tüketiminin bireylerin sağlığı üzerinde doğrudan etkileri olduğu gibi, ülkelerin sınırlı sağlık hizmeti bütçelerini etkileyen dolaylı sonuçları da vardır. Gelişmekte olan ülkeler için ilaç ve antibiyotik tüketiminin belirleyicileri hakkında çok az kanıt bulunmaktadır. Aile hekimliği ile hekimlerin reçete ettiği antibiyotik tüketimi arasındaki ilişkiyi yıllar içinde incelemekteyiz. Ulusal temsiliyeti olan Türkiye Sağlık Araştırmalarını 2008-2012 yıllarını kapsayacak şekilde çalışmamızda kullanmaktayız. Reçete edilen antibiyotik ve ilaç kullanımını belirleyen faktörleri anlamak için En Küçük Kareler yöntemini uygulayarak çok değişkenli bir regresyon analizi kullanmaktayız. Bulgular, antibiyotik kullanım eğiliminin 2010'da düştüğünü ve 2008'e kıyasla 2012'de de düşmeye devam ettiğini göstermektedir. Ayrıca aile hekimi ziyaretinin, Sağlıkta Dönüşüm Programının amacı ile tutarsız olacak şekilde, antibiyotik kullanım olasılığını artırdığını gözlemlemekteyiz. Ancak, aile hekimi ziyareti ile antibiyotik kullanımı arasındaki pozitif ilişki yıllar geçtikçe zayıflamaktadır. Türkiye çeşitli önlemler almış ve antibakteriyel direnci bir dereceye kadar azaltmayı başarmış olsa da, antibiyotikler halen daha tedavi edici yöntemler arasında en çok başvurulan ilaç türü olarak karşımıza çıkmaktadır.

Anahtar Kelimeler: Reçete Edilmiş Antibiyotik Kullanımı, Reçete Edilmiş İlaç Kullanımı, Aile Hekimliği, Sosyoekonomik Belirleyenler

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

Antibiyotiklerin hastalık tedavilerinde kullanımı sonucu birçok hayatı kurtarmasının yanı sıra uygunsuz kullanım ve aşırı tüketim sonucu hastalık süresini uzattığı, ölüm oranlarını arttırdığı ve hastanede daha uzun süre kalma sonucu maliyetleri artırdığı bilinmektedir. Bununla birlikte antibiyotik direncinin global ekonomiye olan etkisi göz ardı edilemeyecek bir durumdur. Bu anlamda, antibiyotik direncinin işgücü piyasasında verimliliği olumsuz etkilediğine dair önemli kanıtlar da literatürde mevcuttur. Sağlıkta Dönüşüm Programı ile birçok önemli sağlık reformuna imza atan ve antibiyotik kullanımını önemli ölçüde düşüren Türkiye, antibiyotik kullanımının halen daha ciddi seviyelerde olduğu ve tedavi edici bir mekanizma olarak kullanıldığı bir ülkedir. Aile hekimliğinin de bu tür yanlış uygulamaları düzeltmeye dönük bir program olması hasebiyle, yıllar içerisinde aile hekimliği uygulaması ve reçeteli antibiyotik kullanımı arasındaki ilişkiyi çalışmak ayrı bir hassasiyete sahiptir.

Araştırma Soruları

Aile hekimi ziyareti ile reçete edilen antibiyotik kullanımı arasında nasıl bir ilişki vardır? 2008-2012 yılları arasında antibiyotik kullanımında artış veya azalış gözlemlenmiş midir? Eğitim, gelir, yaş, cinsiyet ve yerleşim yeri gibi değişkenler reçeteli ilaç ve antibiyotik kullanımı üzerinde etkili midir?

Literatür Araştırması

Türkiye'de antibiyotik tüketimini konu alan araştırmalar sınırlı sayıda ve daha çok hastane ortamında yapılan çalışmalardan ibarettir. Bu çalışmalardan elde edilen genel sonuç; aşırı ve gereksiz antibiyotik tüketiminin Türkiye'de sıklıkla karşılaşılan bir olgu olduğudur. Uluslararası literatürle uyumlu bir şekilde, Türkiye'de de yaşlı bireylerin daha az antibiyotik kullandıklarına dair ipuçları mevcuttur. Diğer önemli bir husus ise, aile hekimi ziyaretlerinin antibiyotik kullanımı ile pozitif anlamlı bir ilişki içerisinde olduğudur. Uluslararası literatürde aile hekimliğinin bu yönüne işaret etmektedir. Bununla birlikte, uluslararası literatürde gelir seviyesinin düşük antibiyotik tüketimi ile ilişkilendirilmesinin yanında, Türkiye'de bu durumun aksi ipuçları mevcuttur diyebiliriz.

Yöntem

Bu çalışmada, aile hekimliği programı ile hekimlerin reçete ettiği antibiyotik ve ilaç kullanımı arasındaki ilişki çoklu regresyon analizi kullanılarak incelenmektedir. Ayrıca reçete edilen antibiyotik ve ilaç kullanımının sosyoekonomik belirleyenlerinin neler olduğu üzerinde de inceleme yapılmıştır. Bu amaca yönelik, iki bağımlı değişken üzerinde durulmaktadır. Bunlardan ilki reçete edilen ilaç kullanımı ve diğeri de reçete edilen antibiyotik kullanımıdır. Bunu gerçekleştirebilmek için, Türkiye İstatistik Kurumu (TÜİK) tarafından 2008 yılından bu yana iki yılda bir ve yüz yüze gerçekleştirilen, Türkiye Sağlık Araştırmalarından yararlanılmıştır. 2014 ve 2016 yılları çalışmanın kapsamı dışında kalmıştır çünkü reçete edilen antibiyotik ve ilaç kullanımına dair bu yıllarda herhangi bir soru sorulmamıştır. TÜİK, 2008 yılında 14.655 kişiye, 2010 yılında 14.447 kişiye ve 2012 yılında 28.055 kişiye sağlık araştırması yapmıştır. Veri kümeleri, genel sağlık durumu, kişinin altı ay veya daha uzun sürmesi

beklenen herhangi bir sağlık sorunu olup olmadığı, bu sağlık sorununun katılımcının günlük yaşamını ne ölçüde sınırladığı, iş kazaları dahil olmak üzere yanıt verenlerin sağlığı ile ilgili çok çeşitli soruları kapsamaktadır. Reçeteli ilaç ve antibiyotik kullanımının belirleyicilerini analiz etmek için En Küçük Kareler (OLS) yöntemi uygulanarak çok değişkenli regresyon analizleri kullanılmıştır. Bu çalışmada ayrıca, Genel Sağlık Sigortası uygulamasından sonra ülkenin antibiyotik kullanımına yönelik eğilimi de rapor edilmiştir.

Sonuç ve Değerlendirme

Bu çalışmada, reçete edilen antibiyotik ve ilaç tüketiminin belirleyicileri, 2008'den 2012'ye kadar, ulusal düzeyde temsil kabiliyeti olan Türkiye Sağlık Araştırmaları kullanılarak araştırılmıştır. Ayrıca, aile hekimliği ziyaretleri ile antibiyotik kullanımı arasındaki ilişkinin yıllar içinde nasıl geliştiği de incelenmiştir. Daha genç yaştaki bireyler daha az tıbbi ürün tüketirken, daha yaşlı bireylerin (45 yaşından büyük) daha fazlasını tükettiği sonucuna ulaşılmıştır. Okuma yazma bilmeyenler ve ilkokul mezunları dışında, ortaokul, lise ve üniversite mezunu insanlar içerisinde reçeteli ilaçlardan önemli ölçüde daha az yararlanıldığı gözlemlenmiştir. Başka bir ifadeyle üniversite veya daha yüksek dereceye sahip olanlar, okuma yazma bilmeyenlere göre daha fazla reçeteli ilaç tüketiyor görünmektedir. Ayrıca, çalışan kişilerin daha az reçeteli ilaç tükettiği de gözlemlenmiştir. Ayrıca, yaşlı bireylerin genç olanlarla kıyaslandığında daha az antibiyotik tükettikleri görülmüştür. Bu durum, doktorların yaşlılar için antibiyotik yazma konusunda daha hassas olduklarını göstermektedir diyebiliriz. Diğer önemli bir bulgu ise; antibiyotik kullanımının 2008 yılından sonra çok keskin bir düşüş sergilediği ve 2010 yılından sonra da bu düşüşün devam ettiği yönündedir. Bunun sebeplerinden bir tanesi; Genel Sağlık Sigortası ile beraber farklı sigorta çeşitlerinin aynı çatı altında birleşmesi ve antibiyotik yazımlarında kontrolün daha efektif bir hal alması gösterilebilir. Ayrıca, Sağlık Bakanlığı tarafından kurulan Akıllı İlaç Kullanımı programının bir sonucu olarak da gösterilebilir. Bu programın amaçlarından biri de, uygunsuz antibiyotik kullanımının zararları konusunda hastaları ve halk sağlığı uzmanlarını eğitmek olmuştur. Ayrıca kurulan MEDULA sistemiyle beraber hastaların geçmişe dair ilaç kayıtları doktorlar tarafından görülmekte ve böylelikle uygunsuz antibiyotik tüketiminin önüne geçilmiş olunmaktadır. Diğer önemli bir bulgu ise, antibiyotik kullanımı ile aile hekimi ziyareti arasında pozitif ve anlamlı bir ilişkinin olduğudur. Fakat bu ilişkinin yıllar içerisinde zayıflamakta olduğu da dikkate değer bir sonuçtur. Aile hekimlerini antimikrobiyallerin uygunsuz ve aşırı kullanımının tehlikesi konusunda eğitmek, sınırlı sağlık bütçesine sahip ülkelerdeki politika yapıcılar için büyük önem taşıdığı düşünülmektedir. Gerçekleştirilen birçok sağlık reformuna ve önlemlere rağmen, Türkiye'de insanlar halen daha tedavi edici yöntem olarak antibiyotik tüketimini tercih etmektedirler. Dolayısıyla, daha çok efektif önlemlerin alınması, bireylerin ve tedavi edicilerin eğitilmesi çok büyük önem arz etmektedir.

1. INTRODUCTION

Antibiotics have saved many lives in treating diseases caused by bacteria since they were first discovered. However, inappropriate use and over-consumption of antibiotics lead to the emergence of antibiotic resistance, which directly impacts patients in the form of more extended illnesses, increased costs, increased mortality, and an extended stay in the hospital (WHO,2017). Besides direct impacts on human life, antimicrobial resistance has some indirect implications on the global economy as well. Employees will take days off because of sickness for which they cannot use antibiotics due to antibacterial resistance, and this will then reduce productivity and cause a higher cost of treatment (WHO,2017).

In this study, we examine the relationship between the family medicine program and the physician-prescribed antibiotic and medicine utilization between 2008 and 2012. Turkey introduced the HTP in 2003 intending to announce Universal Health Coverage (UHC) to provide its citizens with a more equitable, protective, and quality health care system (Atun et al., 2013: 65) The UHC offers individuals, irrespective of their ability to pay, to obtain the necessary treatment. Both supply- and demand-side reforms led to an increase in access to health care services and pharmaceuticals (Stokes et al., 2015). For example, while only 66.3% of the population was covered by health insurance in 2003, this figure increased significantly to 95% in 2016.

Turkey expanded benefits coverage for public health insurance for the most impoverished population in 2005 by providing outpatient care services and reimbursing outpatient pharmaceutical expenditures, which were not covered under the plan in the past (Tirgil et al., 2018). Also, the reimbursement reform allowed employees to access to the Ministry of Health hospitals and private pharmacies (Atun et al., 2013). All these paved the way to easy access to prescribed drugs, which can cause over-utilization and inappropriate use of antimicrobial medicine (Karabay and Hosoglu, 2008: 1169).

Turkey piloted a family medicine program in Duzce province in 2005. Then, contract-based family medicine scaled up across the country until 2010, which aimed at providing a comprehensive set of primary health care services, including maternal and child health care services, immunization services, antenatal services, and first contact of diseases commonly seen in primary health care, through these centers. The health care services offered by family medicine are free to everyone regardless of their insurance status, and the general government budget meets the cost incurred by these services. In the meantime, easy access to primary care through family physicians may lead to over-consumption and improper use of antibiotics by the public (Ternhag et al., 2014).

Turkey was one of the countries where antibiotics over-used by its population (Karabay et al., 2011). Although antibiotics represent the most substantial proportion (11% of the total market in 2018) by volume among therapeutic groups, there has been a significant decline (33%) in its consumption since 2010 (IEIS, 2018). With the help of the HTP, mainly introducing the UHC, the Ministry of Health

has started educational programs that educate specialists, pharmacists, and family medicine physicians on the danger of inappropriate and over-use of antimicrobials (Sağır and Parlakpınar, 2014: 32). Besides, unifying different insurance schemes into one under Social Security Institution by introducing UHC made the Ministry of Health the only authority on deciding what medicinal products will be prescribed and the pricing of pharmaceuticals. Then, the Social Security Institution, with UHC, became the only buyer of health care services in the market, deciding on which medicinal products will be reimbursed (Ozturk et al., 2019). In this way, reforming the health system allowed the Turkish authorities to have more control over antimicrobial utilization and other prescribed medicinal products.

Few studies have examined antimicrobial utilization in Turkey, which provides information on the impact of interventions in hospital settings (Özkurt et al., 2005, Ertuğrul et al., 2009, Yılmaz et al., 2009, Devrim et al., 2009, Ilhan et al., 2009, Saba et al., 2011, Aydın and Gelal, 2012, Mollahaliloğlu et al., 2013, Parlak et al., 2013,). One study examined antibiotic use patterns between 2001 and 2006, using sales data provided by the Intercontinental Medical Statistics (IMS) (Karabay and Hosoglu, 2008). They indicate that the total utilization of antibiotics increased; specifically, the most substantial increase occurred after the reimbursement policy reform in 2005. Another study investigated behaviors of family medicine physicians on the use of antibiotics, conducting analyses in Bolu and Duzce provinces of Turkey in 2006, where the family medicine program was first piloted (Karabay et al., 2011). They find that there exists a considerable amount of over-consumption of antibiotics by family medicine patients. A critical study investigated the relationship between a nationwide antibiotic restriction program implemented in 2003 and antibiotic utilization between 2001 and 2005 in four university hospitals. They find that the program led to reduced costs and antimicrobial resistance (Altunsoy et al., 2011: 339). Another critical study only looked at the socio-economic predictors of prescribed and non-prescribed medicine use in Turkey and found that non-prescribed medicine utilization has been increasing since 2012, while prescribed medicine use has been falling since then (Ozturk et al., 2019).

2. METHODS

In this study, we focus on two outcome variables. First, we examine the determinants of prescribed medication use. Then, we turn to our focus on the predictors of prescribed antibiotic utilization. The question asked in the survey to define prescribed medicine utilization is, 'Have you taken any prescribed medicine, including herbal drugs, vitamins, and dietary products, within the last two weeks?' The question for antibiotic use is conditional on the first question for which if the person states 'Yes,' then the surveys ask, 'Have you taken any prescribed antibiotics?' These two variables are discrete variables, which comprises of 'Yes' or 'No' responses.

We utilize nationally representative Turkey's Health Surveys (THS) implemented biennially since 2008 and conducted face-to-face by the Turkish Statistical Institute (TurkStat). We use THSs from 2008 to 2012 since these are the only surveys asking about the respondent's prescribed antibiotic

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003
Aralık 2020 December

consumption. TurkStat conducted the health surveys for 14,655 individuals in 2008, 14,447 individuals in 2010, and 28,055 individuals for 2012.

The datasets cover a wide range of questions concerning the health of respondents, including overall health status, whether the person has/had any health problem expected to last six months or more, to what extent this health problem limited the respondent's daily life, job accidents in the last 12 months, and physical pain in the last four weeks. Besides health-related information, the datasets include information regarding individual-level background characteristics, including age groups, education level, household income, employment status, gender, urbanicity, insurance status, and the respondent's family physician visit.

We use pooled multivariate regression analyses by implementing Ordinary Least Squares (OLS) to analyze the determinants of prescribed medicine and antibiotic use. In this study, we also report the trend for antibiotic utilization after the UHC implementation, which unified different insurance schemes with almost the same benefits package. We cluster our regressions to obtain correct standard errors based on household identifiers that we have available in each dataset.

In our regression analyses, we use 7 age group dummies (15-24 being the reference category, 25-34, 35-44, 45-54, 55-64, 65-74, 75+), education levels (illiterate being the reference, primary school, middle school, high school or similar, and undergraduate or graduate), 10 categories of household income, employment status (Yes, employed; No, unemployed), gender, urbanicity, health status (good or bad), a health problem in the last 6 months (Yes/No), daily life limitation due to health problem (Yes/No), job accident (Yes/No), physical pain (Yes/No), 6 insurance categories (no insurance being the reference category, government employee insurance, retired government employee insurance, social insurance for workers, Bağ-Kur for self-artisans, green card for the poor, and private insurance), and family medicine visit (Yes/No). We also employ 26 statistical area dummies to control for region-specific effects and survey year dummies in our regression analyses.

Table 1 presents descriptive results. We report the summary statistics for prescribed antibiotic and medicine utilization. The sample that we use to shed some light on the determinants of prescribed antibiotic utilization is conditional on whether the respondent utilizes prescribed medicine. That is the reason why we have a smaller sample size for the antibiotic analysis.

The first two columns indicate that younger age cohorts (15-24, 25-34, and 35-44) utilize more antibiotics than their counterparts within the same age groups, and the difference is statistically significant. However, when respondents get older (greater than 55 years old), the mean of antibacterial utilization significantly declines, where more individuals say 'no' to antibiotic utilization. In the meantime, we observe contrary results for prescribed medicine within age groups. Younger cohorts consume less medicinal products, whereas older cohorts (greater than 45 years old) consume more of them.

Besides, we do not observe any statistically significant differences within educational attainments in terms of antibiotic consumption. As for the prescribed medicine utilization, except for

992

illiterate and primary school graduates, middle school, high school, and university or more graduates indicate significantly less utilization of prescribed medicinal products within their groups.

Table 1. Descriptive Statistics

	Prescribed antibiotic utilization			Prescribed medicine utilization		
	No	Yes	Total	No	Yes	Total
Age groups						
15-24	0.076 [0.266]	0.094*** [0.291]	0.082 [0.274]	0.230 [0.421]	0.082*** [0.274]	0.186 [0.389]
25-34	0.127 [0.333]	0.160*** [0.366]	0.137 [0.344]	0.236 [0.425]	0.137*** [0.344]	0.207 [0.405]
35-44	0.160 [0.367]	0.184*** [0.387]	0.167 [0.373]	0.210 [0.407]	0.168*** [0.374]	0.197 [0.398]
45-54	0.201 [0.401]	0.195 [0.397]	0.199 [0.399]	0.162 [0.368]	0.199*** [0.399]	0.173 [0.378]
55-64	0.195 [0.396]	0.177** [0.382]	0.190 [0.392]	0.090 [0.286]	0.190*** [0.392]	0.120 [0.325]
65-74	0.142 [0.349]	0.120*** [0.325]	0.135 [0.342]	0.047 [0.211]	0.135*** [0.342]	0.073 [0.261]
75 or above	0.098 [0.298]	0.070*** [0.255]	0.089 [0.285]	0.025 [0.157]	0.089*** [0.285]	0.044 [0.206]
Education levels						
Illiterate	0.256 [0.436]	0.265 [0.441]	0.259 [0.438]	0.141 [0.348]	0.259*** [0.438]	0.177 [0.381]
Primary	0.418 [0.493]	0.405 [0.491]	0.414 [0.493]	0.351 [0.477]	0.414*** [0.492]	0.370 [0.483]
Middle school	0.110 [0.313]	0.112 [0.316]	0.111 [0.314]	0.203 [0.402]	0.111*** [0.314]	0.175 [0.380]
High school or similar	0.126 [0.332]	0.125 [0.331]	0.126 [0.332]	0.189 [0.391]	0.126*** [0.332]	0.170 [0.376]
Undergraduate or higher	0.090 [0.287]	0.092 [0.289]	0.091 [0.287]	0.115 [0.320]	0.091*** [0.287]	0.108 [0.310]
Household income						
Less than 350 TL	0.079 [0.270]	0.092** [0.289]	0.083 [0.276]	0.073 [0.260]	0.083*** [0.276]	0.076 [0.265]
351 - 500	0.076 [0.265]	0.102*** [0.303]	0.084 [0.278]	0.082 [0.275]	0.084 [0.278]	0.083 [0.276]
501 -620	0.073 [0.260]	0.087** [0.282]	0.077 [0.267]	0.069 [0.253]	0.078*** [0.267]	0.071 [0.258]
621 - 750	0.102 [0.303]	0.106 [0.308]	0.104 [0.305]	0.096 [0.294]	0.104** [0.305]	0.098 [0.297]
751 - 900	0.116 [0.321]	0.110 [0.313]	0.114 [0.318]	0.107 [0.309]	0.114* [0.318]	0.109 [0.312]
901 - 1100	0.123 [0.328]	0.117 [0.321]	0.121 [0.326]	0.115 [0.319]	0.121 [0.326]	0.117 [0.321]
1101-1300	0.066 [0.249]	0.065 [0.247]	0.066 [0.248]	0.064 [0.245]	0.066 [0.248]	0.065 [0.246]
1301-1700	0.133 [0.340]	0.127 [0.333]	0.131 [0.338]	0.144 [0.351]	0.131*** [0.338]	0.140 [0.347]
1701-2300	0.098 [0.298]	0.086* [0.280]	0.095 [0.293]	0.102 [0.303]	0.094** [0.292]	0.100 [0.300]
More than 2301	0.133 [0.339]	0.106*** [0.308]	0.124 [0.330]	0.147 [0.354]	0.124*** [0.330]	0.140 [0.347]
Insurance groups						
No insurance	0.040 [0.195]	0.045 [0.207]	0.041 [0.199]	0.090 [0.286]	0.041*** [0.199]	0.075 [0.264]
Gov't employee	0.052 [0.223]	0.057 [0.232]	0.054 [0.226]	0.069 [0.253]	0.054*** [0.226]	0.064 [0.245]
Retired gov't employee	0.131 [0.338]	0.107*** [0.309]	0.124 [0.329]	0.083 [0.276]	0.124*** [0.329]	0.095 [0.293]
Social insurance for workers	0.475 [0.499]	0.471 [0.499]	0.474 [0.499]	0.474 [0.499]	0.473 [0.499]	0.473 [0.499]
Bag-Kur	0.182 [0.386]	0.171 [0.376]	0.178 [0.383]	0.147 [0.354]	0.178*** [0.383]	0.156 [0.363]
Green card	0.096 [0.295]	0.126*** [0.332]	0.106 [0.307]	0.107 [0.309]	0.106 [0.308]	0.107 [0.309]
Private insurance	0.023 [0.151]	0.024 [0.153]	0.023 [0.151]	0.031 [0.172]	0.023*** [0.151]	0.028 [0.166]
Individual characteristics						
Employed	0.264 [0.441]	0.283* [0.451]	0.270 [0.444]	0.415 [0.493]	0.270*** [0.444]	0.371 [0.483]

993

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003

Aralık 2020 December

Female	0.644 [0.479]	0.637 [0.481]	0.642 [0.479]	0.507 [0.500]	0.642*** [0.479]	0.547 [0.498]
Urban	0.696 [0.460]	0.705 [0.456]	0.699 [0.459]	0.728 [0.445]	0.698*** [0.459]	0.719 [0.449]
Good health	0.412 [0.492]	0.385*** [0.487]	0.404 [0.491]	0.754 [0.431]	0.403*** [0.491]	0.649 [0.477]
Has/had health problem expected to last 6 months or longer	0.674 [0.469]	0.637*** [0.481]	0.662 [0.473]	0.245 [0.430]	0.663*** [0.473]	0.370 [0.483]
Had limited daily life due to health	0.584 [0.493]	0.608** [0.488]	0.591 [0.492]	0.229 [0.420]	0.592*** [0.492]	0.338 [0.473]
Work accident	0.011 [0.105]	0.021*** [0.142]	0.014 [0.118]	0.016 [0.126]	0.014 [0.118]	0.016 [0.124]
Physical pain	0.651 [0.477]	0.698*** [0.459]	0.665 [0.472]	0.344 [0.475]	0.665*** [0.472]	0.440 [0.496]
Family medicine visit	0.903 [0.295]	0.893* [0.309]	0.900 [0.300]	0.814 [0.389]	0.900*** [0.300]	0.840 [0.367]
N	11492	5219	16711	39120	16742	55862

Notes: Mean coefficients; standard deviations in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Among the Green Card enrollees, a government-funded public health insurance program for the poor, those who said 'yes' to antibiotic consumption is higher than their counterparts who said 'no.' Besides, within the retired government employees, those who say 'yes' to antibiotic utilization is less than those who state 'no.' Although it is significant at the 10% level, respondents state more utilization of antibiotics among employed. While individuals with good health state that they use less antibiotics, those with health problems which limits their daily life seem to use more antibiotics. Besides, respondents who had a work accident and physical pain consume more antibiotics. An interesting outcome is that those with a health problem expected to last six months or longer state that they consume fewer antibiotics than their counterparts, whereas they state that they use more prescribed medicinal products.

3. RESULTS

Figure 1 presents the average prescribed medicine and antibiotic utilization by adults over time. It is important to note here that antibiotic utilization declined dramatically in 2010 and continued declining in 2012. Unifying various insurance schemes into one could be one explanation for this declining trend because having only one buyer of health care services could produce more efficient use of antibiotics in a way that would be used more rationally since there would be more control over prescription antibiotics.

Another likely explanation to clarify why we see a dramatic decline in antibiotic consumption is that the Ministry of Health established the Department of Rational Drug Use to promote rational drug utilization and to raise public and health professionals' awareness on the danger of improper use of antibiotics across the country in 2010 (Akdağ, 2011).

The Ministry of Health also introduced a central system named MEDULA. This new system allows doctors to see their patients' past treatment and medicinal records, which help them avoid prescribing unnecessary drugs or avoid prescribing the same or similar medicinal products. MEDULA helps the Ministry of Health to have control over pharmaceutical expenditures and to track medicinal

prescriptions. We believe that MEDULA helped reduce prescribed antibiotic utilization throughout the country.

On the other hand, drug prices have declined over time in Turkey, which would increase the quantity demanded of prescribed medicinal products. However, we observe a somewhat constant trend over the studied period, increasing first in 2010, then declining afterward. It appears that the interventions mentioned above have canceled out the effect of the price decline in the quantity demanded of pharmaceutical products.

Figure 1. Average Use Of Prescribed Antibiotics And Medicine
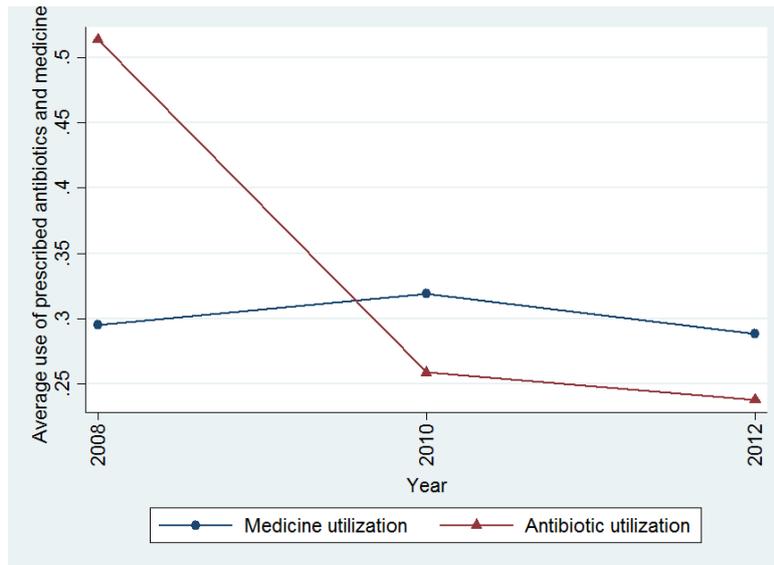
Figure 2 illustrates antibiotic consumption by different insurance groups before and after the UHC was put into implementation. We observe a similar trend for all insurance types, indicating dramatic declines in antibiotics utilization in 2010 and a continuous decline afterward.

Figure 2. Average Use Of Prescribed Antibiotics By Insurance Groups

995

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003

Aralık 2020 December
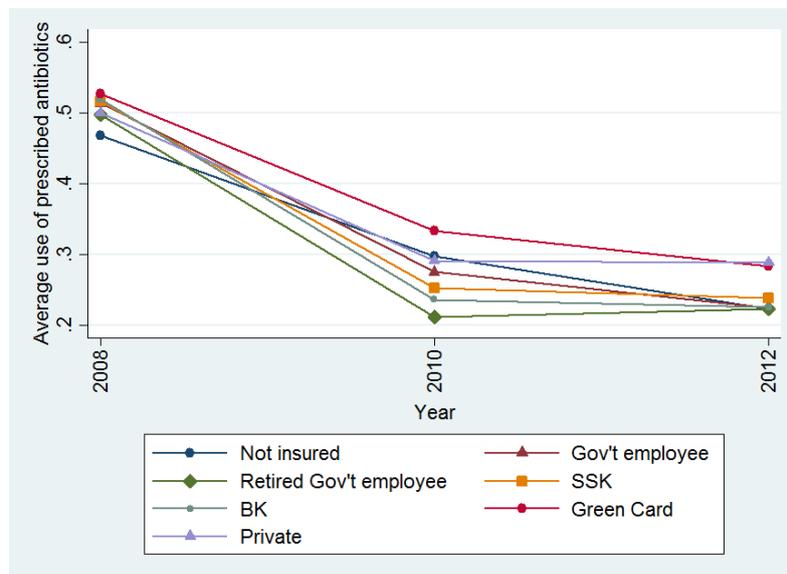
Figure 3 illustrates some pharmaceutical products in terms of unit scale by years. It is shown that antibiotics products are leading therapeutic groups, among others, by 16,4% in Turkey, which went down to 11% in 2018 among treatment groups. This outcome shows us that the declining trend of antibiotics utilization that resulted from the precautions mentioned above has still been going. However, although its consumption has been declining among therapeutic groups, antibiotics are still the most preferred drug type by 2018 in Turkey.

Figure 3. Treatment Groups On Unit Scale
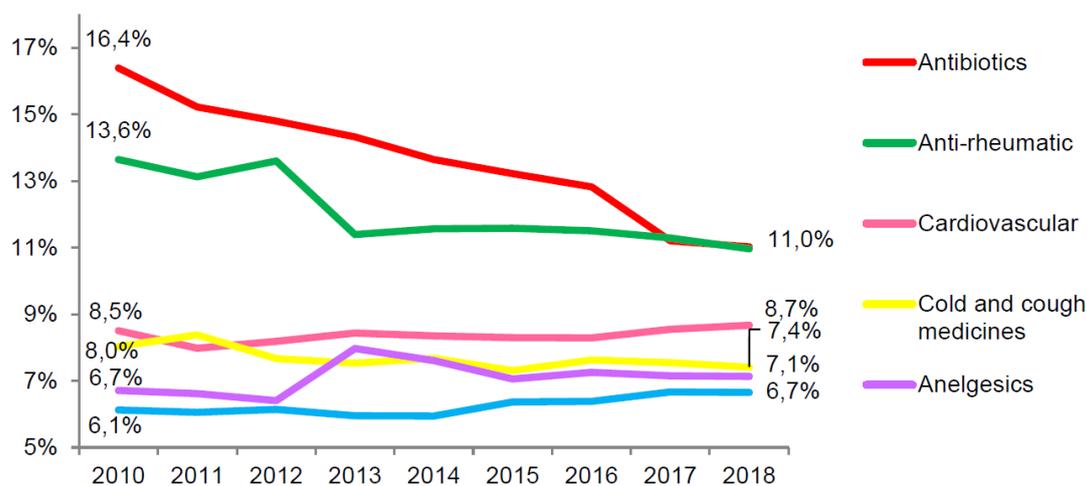
Source: IQVIA, İEİS

Our interest lies in two subjects, which are prescribed medicine and prescribed antibiotic consumption. The first column of Table 2 reports the determinants of medicine utilization in the studied period. We show that medicine consumption is higher for older cohorts than the younger cohort aged 15-24. We expect this result because as people grow older, they will have more chronic conditions for which they may need more prescribed medicine.

Although the coefficients are not significantly different from zero for most education levels, those with a high school degree or more seem to consume more prescribed medicine than illiterate individuals. We also observe that employed individuals consume less prescribed medicine, which may result from not being able to go to a doctor during the day. Those who state that they have health problems, limited daily life due to health issues, and feeling physical pain consume more physician-prescribed medicine. In terms of insurance groups, they are all likely to consume more prescribed medicine than the uninsured group as expected because those with formal insurance will not incur the full cost of pharmaceuticals.

Table 2. OLS Results For Prescribed Medicine And Prescribed Antibiotic Utilization

	Prescribed medicine utilization (1)	Prescribed antibiotic utilization (2)
Age groups		
25-34	0.026*** (0.006)	-0.007 (0.017)
35-44	0.041*** (0.006)	-0.026 (0.017)
45-54	0.084*** (0.006)	-0.056*** (0.017)

55-64	0.154***	-0.066***
	(0.008)	(0.017)
65-74	0.188***	-0.080***
	(0.010)	(0.019)
75 or above	0.209***	-0.121***
	(0.012)	(0.020)
Education levels		
Primary	0.010	-0.012
	(0.006)	(0.010)
Middle school	0.011	-0.011
	(0.007)	(0.015)
High school or similar	0.015**	-0.014
	(0.007)	(0.015)
Undergraduate or higher	0.037***	0.015
	(0.009)	(0.018)
Household income (TL)		
351 – 500	0.004	0.026
	(0.010)	(0.019)
501 -620	0.020*	0.038*
	(0.011)	(0.020)
621 - 750	0.029***	0.040**
	(0.010)	(0.019)
751 - 900	0.028***	0.046**
	(0.010)	(0.019)
901 - 1100	0.047***	0.035*
	(0.010)	(0.019)
1101-1300	0.044***	0.041*
	(0.011)	(0.022)
1301-1700	0.028***	0.062***
	(0.010)	(0.019)
1701-2300	0.045***	0.055***
	(0.010)	(0.021)
2300 or above	0.035***	0.038*
	(0.010)	(0.021)
Individual-level and health characteristics		
Employed	-0.026***	0.006
	(0.004)	(0.010)
Female	0.048***	-0.019**
	(0.004)	(0.008)
Urban	0.018***	0.022**
	(0.005)	(0.010)
Good health	-0.076***	-0.035***
	(0.006)	(0.009)
Has/had health problem expected to last 6 months or longer	0.204***	-0.061***
	(0.006)	(0.009)
Had limited daily life due to health	0.050***	0.040***
	(0.006)	(0.009)
Work accident	0.004	0.099***
	(0.015)	(0.032)
Physical pain	0.096***	0.050***
	(0.004)	(0.008)
Family medicine visit	0.034***	0.073***
	(0.008)	(0.022)
Year		
2010	-0.032***	-0.187***
	(0.011)	(0.030)
2012	-0.054***	-0.210***
	(0.009)	(0.028)
Interaction terms		
Family medicine visit X 2010	0.047***	-0.077**
	(0.012)	(0.032)
Family medicine visit X 2012	0.041***	-0.066**
	(0.010)	(0.029)
Constant	0.013	0.400***
	(0.019)	(0.041)
R-squared	0.227	0.090
N	55862	16711

Notes: Robust standard errors in parentheses. * $p < .1$, ** $p < .05$, *** $p < .01$. We cluster standard errors at the household level. In all regression models, we control for 26 statistical area dummies. While we control for different insurance groups in all our analyses, we do not report their estimates here. Instead, we show the antibiotic use patterns over time for various insurance groups in Figure 2 in the text.

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003

Aralık 2020 December

As for the physician-prescribed antibiotic consumption, older age cohorts consume fewer antibiotics, indicating that doctors may be concerned about the potentially harmful effects of antibiotics to the elderly through antibiotic resistance (Filippini et al., 2006).

Education levels do not produce statistically significant results in antibiotic consumption. It seems that more income yields significant and positive estimates for antibiotic consumption. Besides, we find that income is positively related to more prescribed medicine utilization. What is interesting here that although female respondents state they use more physician-prescribed medicine, they report less consumption of antibiotics than their male counterparts, which can be explained by the fact that doctors do not want to prescribe antibiotics when women are pregnant or expected to be pregnant because this would harm the baby.

Urban residents seem to use more antibiotics than rural ones, which may be an indication of easy access to physicians and pharmacies. Although individuals who report having health problems expected to last six months indicate using more medicine, they seem to consume less of antibiotics, which may be an indication of using other resources than antimicrobial drugs to deal with their health issues. It seems that people who report having good health consume less prescribed medicine and antibiotics.

Another significant result from our analysis is that year dummies show that antibiotic use declines in 2010 and 2012 dramatically compared to 2008. Finally, there is a positive relationship between family medicine visits and antibiotics use, although the aim of establishing a family medicine program was to reduce inappropriately- and over-consumption of antibiotics. However, significant interaction terms indicate that the positive relationship between family medicine visits and antibiotic consumption weakened over the years, indicating that family practitioners are becoming more aware when writing antibiotics.

4. DISCUSSION

In this study, we explore the determinants and consumption patterns of prescribed antibiotics and medicine in Turkey by using large and nationally representative Turkey's Health Surveys from 2008 to 2012. We also examine how the relationship between family medicine visits and antibiotics evolve over the years. To the best of our knowledge, this is the first study investigating the determinants of antibacterial medicine utilization before and after the implementation of the UHC, using nationally representative datasets from Turkey. We uniquely provide essential information on the relationship between antibiotics use and family medicine visits in Turkey.

Antimicrobial-drug resistance has indirect implications as well as direct consequences. One of the indirect adverse effects includes the constraint on the limited health care budgets of countries, which is caused by over-use and improper utilization of antimicrobial medicines (McGowan, 2001: 286). Although Turkey has made significant progress in taking precautions against antibiotic consumption as part of the HTP, improper use of antibiotics still poses a threat to the health system budget because

Turkey is a country where antibiotic consumption and antimicrobial drug resistance is still high. In line with this, a report indicates Turkey will incur an economic loss between $220 billion and $1.4 trillion by 2050 because of antibiotics' antimicrobial resistance and over-consumption (TEPAV, 2017).

Findings indicate that those who visit family medicine are more likely to use antibiotics, which is consistent with the literature by Ternhag and colleagues (Ternhag et al., 2014). They report that easy access to primary care health centers leads to more antibiotic prescriptions. Another critical study indicates that family physicians write the most prescriptions containing antibiotics compared to specialists in other areas such as pediatrics and internal medicine (Mollahaliloğlu et al., 2013: 281). However, the positive relationship between antibiotic use and family practitioners has weakened, indicating that Turkey has promoted rational drug use over the years through the means of family medicine. Besides, Turkey still needs to promote rational drug use awareness and effectively take some policy actions through the Department of Rational Drug Use to reduce inappropriate use of antibiotics and antimicrobial resistance. For this purpose, policymakers can implement policies such as legislative regulations, including rational drug use in primary education curricula, medical and pharmacy faculties. Family physicians are the first contact of most individuals when they get sick. Along the way, family physicians were educated on the danger of antibiotic utilization. However, it still seems a significant issue in terms of prescribing antibiotics. Therefore, special attention needs to be given to these family medicines to reduce inappropriate and over-consumption of antibacterial.

Our estimations report that antibacterial drug utilization declined over time between 2008 and 2012. The dramatic decline we observe was in 2010, and the decline continued afterward. We could explain this result by seeing patients' records on drug utilization through the MEDULA system helped doctors avoid prescribing unnecessary antibacterial. MEDULA also allowed the Ministry of Health to observe physicians' attitudes towards prescribing antimicrobial medicine, and if needed, they could intervene with the process to reduce antibacterial resistance. Another likely explanation is that different insurance schemes, including Social Insurance Organisation, Bağ-Kur, and the General Employees Retirement Fund, were unified under Social Security Institution, which was established as a single organization for financial pooling and purchasing (Atun et al. 2013). Introducing rational drug use programs throughout the country was also beneficial to reduce antibacterial resistance.

Income level increases the prescribed antibiotic consumption, which contradicts with the literature (Filippini et al., 2006, Covvey et al., 2014). Our result suggests that wealthier households in Turkey spend more on antibiotics compared to lower-income households. A likely channel to explain this result is that as high-income individuals will not worry about the high cost of antibiotics, doctors may tend to prescribe them with more antibacterial drugs. Therefore, policy action is needed to intervene in these situations, where inappropriate use of antibiotics occurs.

Although most of the coefficients show the expected sign, education levels do not have a significant relationship with the prescribed antibacterial utilization. Finding may imply that educated people in Turkey are not aware of the perverse effects of antibiotic resistance. These finding urges

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003
Aralık 2020 December

policymakers to provide students early in life with more information on the danger of antibiotic utilization.

We include age groups to analyze the effects of demography on prescribed medicine and antibiotic use. Our findings report that while older cohorts utilize more prescribed drugs compared to younger cohorts, they consume significantly less of prescribed antibiotics (Marra et al., 2010). A channel to explain this finding could be that doctors may stay away from prescribing antibiotics to older patients since antibacterial resistance may have potentially harmful effects on adults (Filippini et al., 2006: 77). We can also explain this outcome by the fact that since using multiple medicines is common for older people; doctors think twice when prescribing antibiotics to these people because there may be side effects or complications other than antibacterial resistance.

Another impressive result that came out from Table 2 is that those with a health problem lasted at least six months indicates that while they use more prescribed medicine than their counterparts without a health problem, their utilization of antibiotics is much less. One explanation is that since these people may have chronic conditions, they need to go to a hospital to see a specialist because that is the only place where they can get better treatment for their chronic condition than family physicians. Specialists may be better aware of the danger of prescribing antibacterial drugs to these people on their health.

Employed individuals seem to be using fewer antibiotics than unemployed; those with good health consume less of antibiotics, those who state that they had a limited daily life due to a health condition are more likely to be using antibiotics than those who state that they did not, having work accident and physical pain correlate with more antibacterial drug utilization.

People in urban areas are likely to use more prescribed antimicrobial drugs. A channel to explain this outcome is that urban dwellers have easy access to pharmacies and health care facilities. We need to keep in mind that since there is no referral system in Turkey, it could be that individuals in urban areas may prefer going to any health institution (public or private) to obtain what they need quickly. In terms of prescribed medicine, urban dwellers are likely to use more of them than rural residents. Turkey also introduced mobile pharmacy services in 2009 to ease access to pharmaceutical products for those who live in a rural neighborhood. However, according to our results, there are significant differences between urban and rural residents in terms of prescribed drug utilization. Therefore, policymakers need to address this problem and maybe strengthen the mobile pharmacy system to have rural people easily reach pharmaceuticals.

5. CONCLUSION

This study decomposed prescribed medicine utilization into whether the person consumes prescribed antibiotics or not and study its determinants. We have demonstrated a significant and positive association between family medicine visits and antibiotic consumption, which indicates easy access to primary care health centers that are scaled up in 2010 throughout Turkey. However, our results also

show that family medicine visits are associated with less prescribed antibiotics consumption over the years. Besides, family medicine visits are related to more prescribed medicine utilization.

Our study has some limitations. For example, not controlling doctors' characteristics may lead to some spurious correlation while examining the relationship between prescribed medicine and antibiotics utilization and individuals' socio-economic characteristics. When data made available, it would be critical to include doctors' characteristics into regression analyses to understand the relationship between our outcome variables and main control variables. Notwithstanding limitations, our results will contribute to the existing literature on health economics, mainly revealing a significant correlation between family medicine programs and antibiotics consumption.

The declining trend in antibiotics use over the studied period indicates that Turkey's interventions helped reduce antibiotics utilization. Specifically, educating family medicine practitioners on the danger of inappropriate and over-use of antimicrobials is of great importance to policymakers in countries with limited health care budgets. Therefore, continuing to implement these precautions and enforcing them will help reduce the improper use of antibiotics. Turkey still needs to continue taking severe actions to reduce inappropriate use and over-consumption of antimicrobial drugs and antibacterial resistance. For future studies, examining what types of antibiotics have been prescribed in different regions of Turkey would be useful for policymaking when the data provides this information, which is currently unavailable.

REFERENCES

Akdağ, R. (2011), Turkey health transformation program assessment report (2003-2011). Retrieved October.10:2014.

Altunsoy, A., Aypak, C., Azap, A., Ergönül, Ö., & Balik, İ. (2011) The impact of a nationwide antibiotic restriction program on antibiotic usage and resistance against nosocomial pathogens in Turkey. International journal of medical sciences, 8(4), 339. doi.org/10.7150/ijms.8.339

Atun, R., Aydin, S., Chakraborty, S., Sümer, S., Aran, M., Gürol, I., Nazlioğlu, S., Ozgülcü, S., Aydoğan, U., Ayar, B., Dilmen, U., & Akdağ, R. (2013). Universal health coverage in Turkey: enhancement of equity. Lancet (London, England), 382(9886), 65–99. doi.org/10.1016/S0140-6736(13)61051-X

Aydin, B., ve Gelal, A. (2012). Akılcı İlaç Kullanımı: Yaygınlaştırılması ve Tıp Eğitiminin Rolü. DEÜ Tıp Fakültesi Dergisi, 26 (1): 57-63.

Covvey, J. R., Johnson, B. F., Elliott, V., Malcolm, W., & Mullen, A. B. (2014). An association between socio-economic deprivation and primary care antibiotic prescribing in Scotland. The Journal of antimicrobial chemotherapy, 69(3), 835–841. https://doi.org/10.1093/jac/dkt439

Devrim, İ., Gülfidan, G., Oruç, Y., Yaşar, N., Sorguç, Y., Ayhan, F.Y., Bayram, N., & Ünal, N. (2009) Point-Prevalence Study Relating to Antibiotic Usage in Dr. Behçet Uz Children Hospital;

Mehmet Akif Ersoy İktisadi ve İdari Bilimler Fakültesi Dergisi - Mehmet Akif Ersoy University Journal of Economics and Administrative Sciences Faculty
Cilt: 7 Sayı: Özel Sayı s.987-1003 Volume: 7 Issue: Special Issue p.987-1003
Aralık 2020 December

Comparison of 2008 and 2012 Data. Journal of Pediatric Infection/Cocuk Enfeksiyon Dergisi. 3(1). doi:10.5152/ced.2012.11

Ertuğrul, M.B., Özgün, H., Saylak, M.Ö., & Sayim, N. (2009) Antibiotic Use and Its Cost in Surgical Clinics of a University Hospital: A One-Day Point Prevalence Survey. Klimik Dergisi. 22(2):44-7. doi.org/10.24938/kutfd.490693

Filippini, M., Masiero, G., & Moschetti, K. (2006). Socio-economic determinants of regional differences in outpatient antibiotic consumption: evidence from Switzerland. Health policy (Amsterdam, Netherlands), 78(1), 77–92. doi.org/10.1016/j.healthpol.2005.09.009

IEIS. Turkish Pharmaceutical Market, 2018. Accessed on 1st May, 2020 http://ieis.org.tr/ieis/assets/front/sektorraporu2018/Turkish_Pharmaceutical_Market_2018.pdf

Ilhan, M. N., Durukan, E., Ilhan, S. O., Aksakal, F. N., Ozkan, S., & Bumin, M. A. (2009). Self-medication with antibiotics: questionnaire survey among primary care center attendants. Pharmacoepidemiology and drug safety, 18(12), 1150–1157. doi.org/10.1002/pds.1829

Karabay, O., & Hosoglu, S. (2008). Increased antimicrobial consumption following reimbursement reform in Turkey. The Journal of antimicrobial chemotherapy, 61(5), 1169–1171. doi.org/10.1093/jac/dkn055

Karabay, O., Özdemir, D., Güçlü, E., Yildirim, M., Ince, N., Küçükbayrak, A., Çakir, S., Gülenç, M., Ince, M., & Demirli, K. (2011). Attitudes and behaviors of Family Physicians regarding use of antibiotics. Journal of Microbiology and Infectious Diseases.1(02),53-57. DOI: 10.5799/ahinjs.02.2011.02.0013

Marra, F., Mak, S., Chong, M., & Patrick, D. M. (2010). The relationship among antibiotic consumption, socio-economic factors and climatic conditions. The Canadian journal of infectious diseases & medical microbiology = Journal canadien des maladies infectieuses et de la microbiologie medicale, 21(3), e99–e106. doi.org/10.1155/2010/965268

Mcgowan, J. E. (2001). Economic Impact of Antimicrobial Resistance. Emerging Infectious Diseases, 7(2), 286-292. doi.org/10.3201/eid0702.700286.

Mollahaliloğlu, S., Alkan, A., Dönertaş, B., Ozgulcu, S., & Akici, A. (2013). Assessment of antibiotic prescribing at different hospitals and primary health care facilities. Saudi pharmaceutical journal: SPJ: the official publication of the Saudi Pharmaceutical Society, 21(3), 281–291. doi.org/10.1016/j.jsps.2012.10.004

Özkurt, Z., Erol, S., Kanadali, A., Ertek, M., Özden, K., & Taşyaran, M.A. (2005). Changes in antibiotic use, cost and consumption after an antibiotic restriction policy applied by infectious disease specialists. Japanese journal of infectious diseases.58(6):338.

Öztürk, S., Başar, D., Özen, İ. C., & Çiftçi, A. Ö. (2019). Socio-economic and behavioral determinants of prescription and non-prescription medicine use: the case of Turkey. Daru: journal of Faculty of Pharmacy, Tehran University of Medical Sciences, 27(2), 735–742. doi.org/10.1007/s40199-019-00311-1

Parlak, E., Çayir, Y., & Ertürk, A. (2013). Rational Antibiotic Use Among Family Physicians: A Cross-Sectional Study from Erzurum. Euras J Fam Med.2(1):27-32.

Saba, R., Inan, D., Turhan, Ö., Yalçin, A.N., Gülseren, F., & Mamikoğlu, L. (2011) Surveillance of antimicrobial use in a Turkish university hospital. Turkish Journal of Medical Sciences. 41(4):701-10. DOI: 10.3906/sag-1005-812

Sağir, M. & Parlakpinar, H. (2014). Rational Use of Medicaments. İnönü Üniversitesi Sağlık Bilimleri Dergisi. 3(2):32-5.

Stokes, J., Gurol-Urganci, I., Hone, T., & Atun, R. (2015). Effect of health system reforms in Turkey on user satisfaction. Journal of global health, 5(2), 020403. doi.org/10.7189/jogh.05.020403

Tepav. (2017) Türkiye'de Antibiyotik Direnç: Ekonomik Değerlendirme ve Öneriler. Accessed on 1st May, 2020, https://www.tepav.org.tr/upload/files/1504774735-1.Turkiye___de_Antimikrobiyal_Direnc___Ekonomik_Degerlendirme_ve_Oneriler.pdf

Ternhag, A., Grünewald, M., Naucler, P., & Wisell, K. T. (2014). Antibiotic consumption in relation to socio-demographic factors, co-morbidity, and accessibility of primary health care. Scandinavian journal of infectious diseases, 46(12), 888–896. doi.org/10.3109/00365548.2014.954264

Tirgil, A., Gurol-Urganci, I. & Atun, R. (2018). Early experience of universal health coverage in Turkey on access to health services for the poor: regression kink design analysis. Journal of global health, 8(2), 020412. doi.org/10.7189/jogh.08.020412

World Health Organization. (2015), Global action plan on antimicrobial resistance. accessed on 1st May, 2020, https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1

Yilmaz, G., Bulut, C., Yildiz, F. (2009). Examining Antibiotic Use at an Education and Research Hospital in Turkey: Point Prevalence Results. Turkish Journal of Medical Sciences, 39(1), 125-131.