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Research Article

OUT OF POCKET EXPENDITURES FOR MANAGING CHILDHOOD ACUTE RESPIRATORY INFECTION IN CHILDREN UNDER 5 IN DISTRICT KASUR PUNJAB

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Abstract:

Background: Acute respiratory infections are major public health threats in children aged less than 5 years. Acute respiratory infections caused 20% of the childhood deaths worldwide in which 99% deaths in children under 5 are reported in developing countries like Pakistan. Globally, about 150 million people were affected with financial loss after out of pocket expenditure on health. Out of pocket costs accounts for 61% of the health care financing in Pakistan. The mortality rates in rural areas in children under 5 are about a quarter to a third higher in comparison to urban areas.

Methodology: Simple random sampling technique was used. Data was collected only on those children under 5 who met the case definition for acute respiratory infection. The main objective of the study was to estimate the cost per episode of acute respiratory infection in children under 5 years. A structured questionnaire was used for data collection. The calculated sample size was 229

Main findings: The median cost per episode of ARI on child treatment was approximately US\$3 (300 PKR). The median of direct medical cost of ARI US\$ 1.5(150PKR) was higher as compared to non-medical costs US\$1.0(100 PKR). Almost every outpatient visit either in private or public hospital resulted in costs for prescribed medication but no laboratory tests were recommended..

Conclusion

Study participants spend more on their male child as compared to female child. Families with higher income have more health expenditures on their child treatment than those having less income. The majority of the parents (75%) preferred to visit private health care providers for the treatment of their children. Estimated indirect cost was higher in public facilities as compared to private facilities because of waiting time to consult the doctor was longer.

Keywords: Out of pocket expenditure, acute respiratory infections, costs, Direct, Indirect, Public, and Private.

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INTRODUCTION:

Health financing is that function of a health systems which is concerned with the mobilization, accumulation and allocation of money to cover the health needs of the people, individually and collectively, in the health systems and its purpose is to make funding available and to set the right financial incentives to providers, to ensure that all individuals have access to effective public health and personal health care (WHO 2000).

Many developing countries, such as Pakistan, face challenges owing to low budget allocation to the health sector and the poor responsiveness of public health systems forces people to visit the private sector, both formal and informal. Absence of a risk pooling mechanism in the health financing system results in high out of pocket payments and this can be disastrous for households because all of their monthly income gets used for their basic needs (Patil S et al.2009).

Health financing in Pakistan:

Pakistan health delivery system comprises of three vertical and two horizontal health institutions. These five systems, including mixed health systems which have public and private providers, cover 34.43(21.92%) million population of the country Pakistan. The remaining 78% of the population pay out of pocket to get the health services.

Like many developing countries, out of pocket (OOP) payment is dominant mode of financing healthcare in Pakistan, accounting for 61% (National health account 2009-2010). The Public sector spends \$ 9.31 per person which is less than the internationally recommended \$ 60 per person (Nishtar.S et al 2013). Due to decline in the development budget, the actual spending on health is very low. Citizens have to pay large amount of out of pocket payments for medical consultation as well as for medicines. (Rehman et al. 2104).

Out of pocket health expenditure:

Out-of-pocket health payments are the costs borne by households at the point they receive health services. These typically include user fees, cost of medication and hospital bills. (HVM Netal.2013).

According to the World Bank report of 2011, in Pakistan, the total health care expenditure per capita has increased by 4% (2008-11) but the total health expenditure per GDP has decreased by 0.4% (2009-11). As a percentage of all the total government expenditures in Pakistan, the general government allocated more budgets for health but it was still less than 4% in 2009 (Nishtar.S et al 2013).The median

household OOP health care in the year 2004-05 was 2500 Pakistani Rupees (PKR) (US\$ 41.99) The median OOP payment on medicines was highest in Khyber Pakhtunkhwa (KPK) (PKR 3000) while the OOP payment for hospitalization was highest in Punjab (PKR 1000).

ARI expenditures:

In addition to causing morbidity and mortality, acute respiratory infections result in economic losses due to excessive use of health resources. Cost-effective interventions against childhood acute respiratory infections are present but their implementation in developing countries has been patchy (Rudan et al. 2007).

A study to assess health care expenditure on childhood illness (in those under 5 years of age) in the last month, found that socioeconomic characteristics were the strongest predictor of health care expenditure. The mean duration of each episode of was 4.6 days. Out of 218 episodes of illness, the majority (158) were treated by private health care providers, 53 episodes by public doctors and 7 episodes were untreated.

Acute Respiratory Infection (ARI) is an infection of any part of respiratory tract or any related structures including Para nasal sinuses, middle ear and plural cavity. European Centre for Disease Prevention and Control case defines it as the acute onset (within seven days) of at least cough, sore throat, shortness of breath or coryza, plus a clinician's diagnosis of an infection. In children, adenovirus is the most often cause of ARIs with fever and runny nose. It can last as long as two weeks.

World health organization (2000) reported that ARIs caused huge disability adjusted life years (in addition to 325 million deaths globally). They are noted to have contributed 3.5% to the global burden of the disease (Selvaraj K. et al 2014). It is estimated that 99 % of the deaths due to ARIs were in developing countries, with a high incidence in boys than in girls (Nair H. et al 2010). More than half of the total number of ARI episodes were reported in children under five years of age in South Asia and Sub-Saharan Africa. (Rudan et al 2004).

Pakistan is the sixth most populous country in the world, with 64% of its population in rural areas (Nishtar S. et al 2013). Poor living conditions in these areas make the community and especially their children less than 5 years of age more vulnerable to infections (Rehman A. et.al 2014). Children under 5 years of age are more susceptible to infections because

of a maturing immune system. Rural mortality rates in children younger than 5 years were about a quarter to a third higher than in urban areas in 2006 (PDHS). In addition to this, out of pocket payments may impose regressive burden on these already impoverished population. Access to health care services in rural areas is a great challenge for the households if the costs are not affordable; not only does this lead to economic loss but also affects the productivity of a country (Chagani SMI. 2014).

Costs of ARIs:

The costs of illness consisted of direct medical, direct non-medical and indirect costs.

The direct medical cost variables included user fee, costs of medicines, and costs of laboratory tests. Direct non-medical costs encompassed the cost of transport to reach in the health care facility for seeking treatment. It also included the cost of food the people spent for their children suggested by health care providers. Indirect cost included the time of the health caregivers for their children care in the health care facility and in home. Indirect medical costs estimated the missed work of caretakers due to illness.

Pakistan is devoid of a social health insurance system and with rising poverty, many households are pushed to the level of catastrophic expenditure for seeking health care. (Abrejo FG et al. 2008). These catastrophic expenditures for health comprised of 70% of the economic shocks for poor population (Nishtar.S et al 2013).

A study done in northern Pakistan about economic analysis of childhood pneumonia in children under 5 revealed that families spent an average cost of \$7.54 per visit the health care facility. In the direct medical costs medicines contributed the highest proportion (40%) of spending during the visit in the health care facility. While in the direct non-medical costs, meals constituted 23.6% and transportation 12.19% of the costs. The time taken to reach in the health care facility from their homes, on average, was 3 hours. The per-episode cost of acute respiratory infection was \$22.62. The mean household expenditure for acute respiratory infections was \$2.10. The median was also reported (median \$83, SD \$5.30).

Khan et al. 2008 reported that the incidence of acute respiratory infections was 29.9 per 100 child year, in children aged between 2-35 months, residing in the northern areas of Pakistan. After calculating the per-episode they estimated the financial burden for acute respiratory infection to be \$ 676. Peasah S et al (2015)

reported that the direct OOP payment of ARI was 34% of annual per capita income. Therefore, this study aimed to estimate the cost (direct medical & non-medical) per episode of acute respiratory infection in children under 5 years and to find out relationship of cost per episode of ARI with demographic characteristics of respondents.

METHODS:

Design & setting - This was cross-sectional study, which was conducted between March-May 2015 in the village Ghaniye-ke. This village is one of the ten in the union council of Zafarke-ke, which in-turn is one of the twenty-eight in the tehsil of Kot Radha Kishan. The latter is one of the five tehsils of the district Kasur (this shares the border with India).

Kasur was selected as it's one of remote districts of Punjab and its tehsil Kot Radha Kishan, because it has both rural and urban areas. Its surrounding villages like Zafarke-ke are totally depending on Kot Radha Kishan for transport (Railway Station, Bus Stand) all health care facilities (hospitals, clinics) Post Office, Banks, and Colleges and for all other basic needs.

Selection techniques and participants The selection was done using simple random sampling. The population of the village Ghaniye-ke was about 13,000. From this, 900 households had children aged less than 5. A sample size of 229 was generated from this, using Openepi.org.

The sampling unit of the study were all the households having children less than five and its study population were their mothers.

Ethics, consent and permissions - The proposal for this research was approved from institutional review board of Al-shifa Trust Eye Hospital, Rawalpindi and permission sought from the Executive District officer of health in Kasur and for data collection in Kot Radha kishan. Written (signatures or thumb impression) and verbal informed consent was obtained from each participant who was willing to participate in the study.

Collection tool - Data of only those children were collected who met the case definition for acute respiratory infection. A structured questionnaire in Urdu was used. This was pretested to ensure comprehensibility of the mothers. It had three sections: the first part contained the socioeconomic and demographic information of parents of the (affected) children, the second part examined the clinical manifestations of the illness and the health care utilization behavior of the parents (symptoms and the duration of ARI, as noted by the mother, in the last

one month and the type of health provider commonly visited respectively) and the third part of inquired about the total costs per episode of acute respiratory infection (both direct medical and direct non-medical costs). The time taken to complete this questionnaire was approximately 15-20 minutes. There were no refusals to this collection.

Variables - The independent variables included in analysis were mainly demographic (age, gender, education level of the parents, total number of children, number of children under 5) economic (household income and expenditures). All the cost variables including direct medical costs were user fee, cost of medicines and laboratory test. Direct non-medical variables were cost of transport and food during the visit in health care facility. The single outcome variable was total cost per episode of acute respiratory infection in children under 5.

Data analysis - Data was analyzed using SPSS version 16.0.

Frequency and percentages were reported for gender of child, education status of parents, family system, and type of health care provider. Rest of the data comprised mostly of continuous variables (including all the costs). Medians, with minimum and maximum values and interquartile ranges for different cost categories were reported instead as the data was found to be not normally distributed (Shapiro-Wilk test with

a p value < 0.05, a normal Q-Q plot and a skewed and kurtotic histogram).

Out of pocket health expenditures on common ARIs at public and private health care facility level, duration of symptoms in the last episode and its relationship with socioeconomic characteristics were compared by non-parametric tests like Mann Whitney and Kruskal-Wallis. Direct medical and non-medical costs were calculated by study site, age group of the children and the type of health care facility (public vs. private). (average exchange rate of US \$1= PKR 102 rupees, 2015)

Results:

A total of 229 mothers were interviewed during the study, all of whom took part. From these, 148 mothers (64%) were found to be educated and rest had no formal education. In 75 % of the educated mothers, only a small proportion had a graduate and post-graduate education. Of the remaining, 21% had a primary education, 10% had a middle, 20% had a Matric and 16% had done their intermediate. Of the fathers, 27% were uneducated and only about a quarter (23%) had a primary education. Again, a very few had acquired a graduate and post-graduate education (3.5 and 1.3% respectively). Family systems identified were nuclear (52 %) and extended (48%).

Socioeconomic characteristics of fathers of children under 5 (n=229).

Variable	Number 229	Percentage (%)
Father education Level		
Uneducated	61	26.6
Primary	53	23.1
Middle	49	21.4
Metric	30	13.1
Intermediate	25	10.9
Bachelor	8	3.5
Master	3	1.3
Father Occupation level		
Unemployed	2	.9
Factory workers	116	50.7
Labour	50	21.8
Business	46	20.1
Farmer	15	6.6
Monthly income (PKR)		
<10000	37	16.2
10000-20000	157	68.6
21000-30000	29	12.7
>30000	6	2.6

Approximately two thirds (69%) of the study participants earned a monthly income ranging between PKR 10000-20000 (US\$108 - \$196) per month. According to occupational status of parents, half (50.7%) of the fathers worked in a factory. In the 229 children (under 5) included in the study, more than half (52 %) were females. Most (43%) of the children were in the age range from 13-24 months, with a median age of 18 months. Only 66 children had a clinical diagnosis. Shortness of breath (38%) followed by a sore throat (28%) were the most commonly reported symptoms.

Larger number of the children (95%) reported about 1 to 3 episodes of ARI in the last month. The median duration of the last episode of ARI, from symptom onset to recovery, was 9 days. About half (51.5%) of the children had an episode lasting 1 to 3 days. Virtually all the mothers (97%) visited a health care provider for the treatment of their children. The rest resorted to either home remedies (1.3%) or directly purchased drugs from a medical store without a (medical) consultation (2.2%). Two thirds of the mothers visited a private health care provider (a Pediatrician or a compounder) and the rest utilized public (Government) health facilities (public dispensary and/or rural health center). The latter included allopathic doctors, dispensers and lady health workers. Private compounders (45%) were visited because of free medicine and a lower fee, while private pediatricians (31%) were consulted by mothers because of their fame and the presence of facilities at their clinics.

Cost Analysis:

The treatment cost per episode of acute respiratory infection in children under 5 was calculated taking into account the direct medical (user fee and drugs cost) and direct non-medical (transportation and food) costs. The median cost per ARI episode was approximately PKR 300 (US\$3) (IQR 108-683PKR). The maximum direct expenses incurred on the parents were PKR 950, with median of PKR 150 (IQR 50-300) and direct non-medical costs were PKR 400 (median PKR 100; IQR=50-150).

Consultation costs and that of the prescribed medicine made the most contribution to the direct medical cost for ARI treatment. These were lower in public facilities as compared to private health settings. The median costs of medicine were PKR 250 and PKR 100 for private and public facilities, respectively. The

median costs of the user fee were PKR 100 and PKR 3 for private and public, respectively.

In the direct non-medical costs, for both the public and private health care facilities, the median cost of transport to visit the doctor was PKR 80 and that for the food was PKR 50.

The only reported cost incurred for ARI in a non-medical setting was that of medicine bought at the (medical) stores. There the median cost of medication was PKR 105 (US\$ 1.30).

Indirect costs were estimated in the form of the time the caretakers spent in the health care facilities and at home. Estimated indirect cost was relatively higher in public facilities because of long waiting time to see a doctor. This time was about an hour more than waiting in a private setting. Most of the study respondents visited the health facilities at timings other than work and so did not report loss of money due to absence.

It was noted that majority of the residents (60.3%) walked to visit the health centre. Most of them (52%) reported borrowing from neighbors and relatives in arranging money for the treatment of their child.

Inferential:

People spent relatively more on their male child ($p < 0.05$). Gender and age of the sick child were significantly associated with the total expenses on the ARI ($p = .002$). The occupation of the child's father and household income also had a significant association with this expenditure ($p = .002$).

Educational attainment of the mothers had a significant association with the type of health care provider they consulted for their children ($p = 0.00$). A strong difference between arrangement of money spent on under 5 child's treatment and the cost per episode of ARI ($p = 0.0001$) was noted. A significantly strong difference was also found in between the type of health care provider consulted and the cost per episode of ARI ($p = 0.0001$), where the fee charged by the private health provider was way higher as compared to other health providers ($p = .0005$). While comparing the distance of health care facility and mode of transportation with the cost of acute respiratory infection, a difference found in between these two variables and the costs incurred ($p = .0001$). Frequency of total episodes of ARI ($p = .246$), the duration of its last episode ($p = .631$) and the number of children per household ($p = .60$) had no significant affect(s) on the expenses

Socioeconomic indicators of cost per episode of ARI in children aged < 5 year in Punjab, Pakistan.

variable		Median	Mean rank	p-value	z-value
Family type	Nuclear	23	110	-1.294	.000
	joint	45	121		
Household income	1-10,000	180	95	36.03(3)	.002
	11-20,000	240	107		
	21-30,000	950	180		
	31-40,000	635	155		
Mother Education level	Uneducated	270	107	29.33 (6)	.000
	Primary	205	102		
	Middle	163	91		
	Matric	375	117		
	Intermediate	500	151		
	Graduation	1000	186		
	Masters	870	182		
Father education level	Uneducated	180	96	20.585 (6)	.002
	Primary	280	112		
	Middle	300	118		
	Matric	266	105		
	Intermediate	560	153		
	Graduation	475	142		
	Masters	1020	201		
Father occupation	Unemployed	57	118	15(4)	.005
	Factory	110	300		
	Farmer	133	300		
	Business man	143	625		
	laborer	98	235		
Number of children	1-3	301	117.21	1.001(2)	.60
	4-7	200	106.62		
	8-10	250	102		

DISCUSSION:

Our study provides a detailed overview of the cost of acute respiratory infections: in different age categories (under 5), at different types of health care facilities and levels of care, and exclusively the non-medical cost of ARIs.

A number of factors directly influence people's attitudes for seeking health care, amongst which economic status of the household is an important determinant. The result of this study validates the literature and shows a strong association of socioeconomic status, including household income, with the type of health care provider consulted. Results of previous studies showed that out of pocket health expenditure is borne by a large proportion of the population. Our findings showed that majority of the population of study area were just above the poverty

line. The preference for private health care providers (75%) for treating their sick children is a major finding supported by the results of the Pakistan Demographic and Health Survey 2007-2008.

According to our study results, of the 229 households, 75% of the families visited private health care providers in which the majority of the private providers were compounders (45%) and to a lesser extent allopathic doctors with formal qualification (30%).

In contrast to this a study in peri-urban Wardha, India found that all the enlisted children in their sample of 238 were taken to the allopathic doctors for their treatment (7). A similar study by Aneeqa Rehman et al (21) related to out of pocket expenses in children less than 5 conducted in Islamabad supported our finding

that educated mothers preferred visiting private health providers. Socioeconomic variables and the household income status of the people living in Katchi Abadis (slums) of Islamabad were similar to the baseline characteristic of our study area population. In our study, families with higher income (> PKR 15000/month) were found to have more health expenditures on their child's treatment ($p=.002$) than those earning a lesser amount. This is in contrast to the findings of Amol R Dongre et al (2014) (7).

Another finding of borrowing the money from neighbors to treat their children in our study area is also supported by the previous study mentioned. Fever, common cold and cough are the most reported symptoms in our study children under 5 as the existing literature support this finding.

A dissimilar yet interesting finding in comparison to our study was also found with Aneeqa Rehman et al's study (21) that gender of the child was non-significantly associated with the expenses incurred by the parents. Our study showed that the study participants spent more on their male child as compared to female child. This may be attributed to the gender bias that still exist in Pakistan's rural societies. Whereas people living in Katchi abadis (slums) of Islamabad were possibly influenced by their urban surroundings.

A finding of our study is that costs at all levels of private health care sectors are up to twice as compared to public health institutions similar to a prior study findings of Chatterjee S et al .in India (2007) (6) Indirect costs were found to be lower because people visited health care providers during days off from work or after the work. This finding is similar to the results finding of the other similar studies in Asia. Singh CH et al in India found that indirect costs were half of the direct costs. In contrast, Simmerman et al. found that in Thailand, both the direct and indirect costs of ARIs are equal, and also it is evidenced from some European countries that indirect costs are higher in comparison to direct costs. Perhaps the reason of this difference is that most of our respondents were housewives who reported not losing money due to the child illness. There is a need to correctly estimate the total indirect costs of ARI as they directly affect the costs for ARI.

We were able to get a detailed view of cost per episode of acute respiratory infection including all the direct medical and non-medical costs to managing childhood ARI in under 5 children. Also the cost of

non-medically treated illness is also described. A study similar to our study in Northern India also reported the cost per episode of acute respiratory infections on different aged groups. The total direct cost of an ARI episode reported in India at public level is US\$4-\$6 for public and \$4-\$10 for private institutions. The cost of ARI is described both at public and private health care level in our result section. While in our study the total direct cost ARI episode at public level is US\$2-\$3 (PKR 200-300) and at the private level it is ranged between US \$5-\$8 (PKR 500-800). This difference in the finding of total direct cost of ARI could be due to the different medical costs at different levels of health care in India.

Provider cost was found to be higher than the model presented by Bryce et al (2005). This model estimates the costs of treatment only at primary and community level. Whereas in our study the total costs of ARI is estimated at level of health care.

The results indicate that in direct medical costs the major and expensive part is due to medication cost supported by another study conducted in Northern areas of Pakistan. The mean duration of ARI episode that is mostly reported in our study is of 3 days supported by another study conducted on childhood illnesses including acute respiratory infection (Patil S et al.2009).

Strengths and limitations of the study:

One strength of this study is the use of simple random sampling technique which reduced the chance of bias. Another significant strength of our study is that it estimated the costs at both public and private health care providers, and the non-medical costs. Additionally, our study had a limited period of recall (a month) which minimized inaccurate estimates of all reported costs.

Several limitations were also considered while interpreting our result findings . Owing to a small sample size of children in a small geographic area, the reported costs of acute respiratory infection might not be representative of the actual costs of the ARIs. The out of pocket treatment incurred by the ARIs were self-reported and not verified with medical records. As the respondents of our study were the mothers, it was difficult to properly estimate the indirect costs that resulted in loss of productivity. Also, in the direct non-medical costs (cost of transport and the time in the health care facility during the visit), the time parents spent at home during their child's illness was not accounted for.

CONCLUSION:

In conclusion, our study has shown that parents spent more on their male child as compared to female child. Families with higher income had more health expenditures on child treatment than those with lesser income. The majority of parents (75%) preferred visiting private health care providers for the treatment of their children. Direct medical costs, at all levels of private health care facility, were up to twice as high compared to public health facilities. Medications contributed most to direct medical costs. The indirect costs were relatively lower as people visited the health care providers on either their off days or after their work.

Recommendations:

- The costs of ARI episode estimated are considerable in our study area population and should be considered when assessing public health urgencies.
- Health care sectors need to focus on preventive measures for children under 5 to reduce the morbidity level. Poor living conditions in rural areas expose the community to severe infections.
- Community-based interventions such as breast feeding, hand washing, clean fuel for cooking should be applied in poor rural areas to reduce the burden of ARIs. Lady health workers are key persons of the community; they can help educate the mothers about these small scale preventive strategies.
- Parents, especially mothers, could be educated through public media messages on televisions.
- Improved quality of health delivery services in government dispensaries could be a prompt intervention.
- Qualified health professionals must be recruited at community level to reduce the burden at other health facilities. Access to health care facility should be easy for the community so that the indirect costs can be avoided. To reduce the burden of out of pocket costs on these vulnerable community a safety net system should address in the form of vouchers having health messages and cash transfer schemes for their children's health.
- It is crucial to address health inequities related to gender and rural-urban divide. In our study, the cost estimates are lower because of the absence of admitted cases and diagnostic findings for acute respiratory infections. To find out the correct estimates a study with a larger sample size needs to be carried out.

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