Caregivers' willingness-to-pay for a topical anesthetic cream for minor medical procedures in children

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Abstract

Background: Topical anesthetic cream (TAC) is not in use in pediatric practice in Sub-saharan regions. Knowledge of Caregivers' willingness-to-pay (WTP) for the cream is necessary for its deployment.

Objective: To determine the WTP for TAC for minor pediatric painful procedures.

Materials and Methods: The study was a questionnaire-based conducted in two tertiary health institutions in southeast Nigeria. WTP was elicited using the contingent valuation method. The respondents were caregivers to children that attended out-patient clinics and in-patient. Data analysis was by Statistical Package for the Social Sciences software (SPSS) and STATA11.

Results: Majority (94%) of the respondents were willing to pay for TAC. The mean maximum WTP was US$8.31. Multivariate analysis showed no statistically significant association between many variables with WTP for TAC.

Conclusions: Their average WTP was higher than the market price of topical anesthetic cream. Therefore, there is a good prospect for TAC if deployed in Nigeria.

Key words: Childhood pain, Nigeria, topical anesthetic cream, willingness-to-pay

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Introduction

Painful procedures are common practice in pediatric practice. These pains are essentially from intramuscular injections, intravenous cannulation, venipuncture, and lumber puncture and have both immediate and long-term impact.[1] It affects all age groups, including new born babies.[2-4] Children in middle and low income countries are exposed to these painful stimuli without any form of alleviation. If pain was poorly managed, even with improved analgesia in the subsequent procedures, there is always a apprehension of worse anticipatory pain behavior[5,6] and this relates to stronger negative responses to pain further in life.[7] Even parents and providers also feel distressed.[2] The common practice of using analgesics to alleviate pain is not effective,[8] but prevention of pain can be achieved through various effective methods, which topical anesthetic cream is one of such methods.

In the last decade several effective topical anesthetic drugs have been developed. Among them, Eutectic Mixture of Local Anesthetic (EMLA) remains the most suitable for clinical usage especially on children, given its proven efficacy and safety profile by several clinical trials.[9] EMLA cream is a 5% eutectic mixture of lidocaine 2.5% and prilocaine 2.5%. When the cream is applied, anesthetic is achieved over the area after 30 minutes.[10-12] In spite of the potential use of the topical anesthetic creams (TAC) to alleviate pain, it is not in use in most sub-Saharan countries. Cost may be one of the

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reasons for none deployment as well as lack of awareness by both caregivers and the medical personnel. A 5-mg tube of EMLA that will be enough for two procedures will cost about US$ 5.5; an amount that many may not be able to afford in sub-Saharan African countries where about 43% of the urban and 59% of the rural populations are living under the poverty line of US$521.00 per person/year and US$311.00 per person/year, respectively.[13] About 61-72.8% of the population are living on less than US$1.00 per day.[14,15] A study in developed countries showed that 77% and 37% of the parents were willing to spend an extra $15.00, and $100.00, respectively, to prevent pain.[16] But such information will not be suitable for policy change in low and middle income countries like Nigeria.

In economics, WTP is the maximum amount an individual is willing to pay, sacrifice or exchange to receive a good or to avoid something undesired.[17] One method of evaluating WTP is the contingent valuation method (CVM) that elicits the maximum WTP via a survey method that determines individuals' financial value of health states or health care.[18-20] The CVM is extensively used in health to explore individuals' preferences for products and services for which markets do not exist else are subject to severe market failures. There was also the issue of equity: Equal access for equal needs irrespective of income and other socio-demographic characteristics.[21,22] Without equity in access to usage of TAC, the intended universal alleviation of childhood painful experiences will be difficult to achieve, given that the amount, different caregivers are willing-to-pay, will differ with difference in socioeconomic status (SES).

The WTP survey has been used in Nigeria for different healthcare services and goods.[23-26] However, within the limits of our literature search, there are no studies in Nigeria that have evaluated the caregivers' WTP for the use of TAC to alleviate pain on their children. This study, therefore, aims to determine caregivers WTP for topical anesthetic cream for minor procedures on Nigerian children. This WTP estimates will determine the level of benefits that people attach to TAC and is a guide for future government's decision on its subsidy as well.

Materials and Methods

The study was a cross-sectional study that took place in two tertiary hospitals in southeast Nigeria. These were the University of Nigeria Teaching Hospital, Enugu, Enugu State and the Federal Medical Center, (FMC) Umuahia, Abia State. Both hospitals have Departments of Pediatrics that render out-patient and in-patient services. The two hospitals were chosen by random sampling from a frame of four tertiary hospitals in Enugu and Abia States of southeastern Nigeria: Enugu State University Teaching Hospital (ESUTH), UNTH Enugu (both in Enugu State), as well as the Abia State University Teaching Hospital (ABSUTH) and FMC (both in Abia State) which run residency programs in pediatrics in the two states.

Minimum sample size of 187 was calculated using the power of 80%, the 95% confidence level and based on 50% of the children population with illness that utilize the services of hospitals[27] and out of this about 6% utilize services of tertiary hospital.[27] The recruit of children who attended the out-patient clinics as well as those on admission who had painful experience within the preceding one month were systematically and randomly recruited.

A pre-tested interviewer-administered questionnaire was given to the parents of the children. Data was collected about the respondents' demographic and socio-economic status, and based on household assets ownership. The respondents were requested to subjectively rate the level of pain their children felt from the painful procedure, with "1" and "10" being the lowest and highest rates, respectively. Rate of ≤ 5 was taken as low whereas ≥ 6 was taken as high. The reference was the most recent painful experience.

In the WTP elicitation scenario, the TAC was described as when applied on the skin, anesthesia is achieved after about 30 minutes. The respondents were also informed that one tube is enough for two procedures. They were requested to declare whether they are willing to use the cream, as well as rate their level of willingness as already stated above. The maximum amount there are willing to pay to avoid pain was elicited using a bidding game approach. The starting-bid was US$6.5:Average price for a tube of TCA. Although, a tube can serve for two procedures, which means half the price for a procedure, but a tube has to be bought to prevent even one single pain episode. This was either increased or reduced by US$1.6 depending on the respondent's response. The respondents were allowed two bids and the last bid was taken as the maximum WTP after which the respondent will mention the maximum or minimum amount willing to pay.

Inequalities in WTP for topical anesthetic cream were examined by household SES[28,29] that was generated based on ownership of household asset. List of assets to differentiate households by economic status was obtained from review of previous studies in the same localities.[30] These include a radio, bicycle, motorcycle, motorcar, refrigerator, and generator. As studies have shown that it is often a major challenge to obtain information on household income,[31,32] the spending on household food consumption was used to project household income. The estimation was based on the monetary value of both purchased and produced consumed food products. The continuous SES was created using principal components analysis (PCA), based on information on household asset ownership and food consumption. Ordinarily, the standardized economic SES measures should rely on monetary information, like

consumption, expenditure, or income. But it is difficult to accurately provide collection of data based on income,[33,34] likewise, utilization of expenditure or consumption measures; which are more reliable but easier data[35] is limited due to the requirement of extensive data, which will be time-consuming and costly. In view of these challenges with collection of data on income and expenditure, data on variables that reflect the household standard of living; ownership of assets, housing characteristics and infrastructure are collected to generate SES. Furthermore, other methods of categorizing SES based on ranking of the education and occupation of either mother or father, respectively or both; Olusanya *et al.*,[36] and Oyedeji *et al.*,[37] though useful in study on access to care, they are not suitable for economic study of inequality between households. The SES was categorized into equal quartiles (4 groups). The SES groups were: poorest (Q1), very poor (Q2), poor (Q3) and least poor (Q4). The SES was matched with WTP. All amounts were generated in Nigeria naira and converted to US dollars based on the current exchange rate of N162.00 to 1 USD.

Chi-square was used to test for statistically significant difference. The proportion of each dependent variable in all the SES quartiles was the measure of inequity. Multiple regression analyses were used to establish the level of correlation between willingness to use topical anesthetic cream and SES.

Ethical considerations

The study received ethical approval from the Ethical Committee, UNTH, Enugu. Informed verbal and written consent was collected from all the respondents.

Results

Respondents' demographics

Out of the 188 respondents, majority 160 (85.1%) were female [Table 1]. The mean age of the respondents was 33.7 years. All the respondents have one form of formal education. Majority of the respondents were decision-makers in issues concerning household expenditures. Civil servants and businessmen were the main occupations of the respondents.

The children's painful experiences and Caregivers' rating of children's pain

Intramuscular/subcutaneous injection was the most frequent painful procedure performed on 142 (75.5%) of the surveyed children [Table 2]. The average painful procedures experienced per period of illness was 2.77 with an average pain rating of 6.95.

Most of the respondents stated a positive WTP for TAC [Table 3]. The mean maximum WTP was US$8.31.

Relationship between socioeconomic status and WTP

The WTP was positive in about 94% of respondents in all SES quartiles [Table 4]. The mean maximum WTP were US$ 6.06, US$ 7.87, US$ 7.42, and US$ 10.68 for Q1, Q2, Q3 and Q4, respectively.

Multivariate analysis showed no statistically significant association between many variables with WTP for TAC [Table 5].

Table 1: Respondents' demography

Variables	*N*=188	Percentage
Gender		
Male	28	14.9
Female	160	85.1
Age		
Mean (SD)	33.7 (7.6)	
Range	17-55	
Education		
No formal	0	-
Primary	12	6.4
Secondary	54	28.7
Tertiary	122	64.9
Average years schooling (SD)	14.2 (3.5)	
Main income earner		
Yes	80	42.6
No	108	57.4
Decision-makers		
Yes	124	66.0
No	64	34.0
Occupation		
Civil servant	82	43.6
Businessmen	40	21.3
Self-employed professional	24	12.7
Driver	12	6.4
Employed in private sector	10	5.3
Petty trader	8	4.3
Unemployed	6	3.2
*Others	6	3.2

*others: Farmer, Footballer, Retired, Laborer; SD=Standard deviation

Table 2: Children's painful experiences and caregivers' rating of the pain

Variables	*N*=188 (%)
Painful minor procedures	
Intramuscular/Subcutaneous injections	142 (75.5)
Venipuncture injection	128 (68.1)
Intravenous cannula insertion	96 (51.1)
Facilities where received	
Public	184 (97.9)
Private	30 (16.0)
Chemist/patent medicine vendor	24 (13.0)
Home	1 (0.5)
Average painful procedure/period of illness	2.77
Average rating of the pain (SD)	6.95 (2.54)

SD=Standard deviation; Some respondents gave two or more responses to an individual variable

Discussion

In this study, most respondents were willing to pay some amount for TAC to prevent their children's pain. They rated the level of pain high. This is supported by what Garder *et al.*,[38] reported. Parents are known to overestimate their children's pain. Also other studies have shown that education correlate positively with WTP for any product.[24,25] In this study, all the respondents have formal education, which can explain the high WTP found in the study.

Table 3: Willingness-to-pay to avoid experiencing pain from minor painful procedures

Variables	*N*=188 (%)	WTP	US$
Willingness-to-pay			
Yes	176 (93.6)		
No	12 (6.4)		
Rating of WTP amongst 176 positive responders			
1-3	0 (-)		
4-6	32 (18.2)		
7-9	24 (13.6)		
10	120 (68.2)		
Rating of painful procedure			
1-5	52 (27.6)	7.9	7.5
6-10	136 (72.4)	8.6	8.5
Rating of painful procedure			
1-5	52 (27.6)		
6-10	136 (72.4)		
Respondents' minimum WTP			2.8
Respondents WTP US$6.45	124 (66.0)		
Respondents WTP US$8.06	90 (47.9)		
The mean maximum WTP			8.3

WTP=Willingness to pay

Table 4: Socioeconomic status discrepancies in willingness to pay

Socioeconomic status	WTP	Mean Maximum WTP amount (US$)
Q1 (*n*=47)	93.7%	6.06
Q2 (*n*=47)	93.5%	7.87
Q3 (*n*=47)	93.3%	7.42
Q4 (*n*=47)	94.3%	10.68

WTP=Willingness to pay; "*n*" is the number of subjects in each quartile

The average maximum WTP of the respondents was high. This showed that the respondents value the anticipated benefit from TAC as most respondents rated their children's pain high. According to Lopes *et al.*,[39] most consumers' interest is on "expected benefits" and this is an important determinant for their willingness to pay. There are other factors, such as impression on quality and provider reputation, only indirectly influenced WTP via anticipated benefits.[39] In this study, the mean WTP for TAC of those who rated their children's pain high were maximum than the mean WTP of those who rated the pain low. Thus the higher their perception of their children's pain, the higher the expected benefit if the pain is relieved, and the higher their WTP for the TAC. More so when parents have been found to feel distressed while their children were being immunized, and would like to use a TAC if recommended or approved by their physician.[40]

The average WTP of the least poor quartiles was higher than that from the poorest quartile. Due to financial benefit, consumers with higher income will tend to be more willing to pay for a product.[41] This is similar to what Uzochukwu *et al.*,[23] reported in their study of WTP for rapid diagnostic test for malaria. Despite the fact that the poor are willing to pay less for TAC, it is interesting to know that even the mean (US$6.1) of the poorest quartile is higher than the average market price for TAC of US$ 5.5.

The limitation of this study was the hospital-based design of the study. This may have influenced the response by some of the respondents who might have given some responses to please the interviewer by accepting a high price, whereas others who may be concerned that their response will be used to fix the market price for the cream may decide to say very low price. Inclusion of household survey would have guaranteed uninfluenced responses. But in WTP studies, there have been debates on the correct population to survey. Those who argue in favor of the general public[42] were of the opinion that every population that stands the chance of benefiting from such program in future should be included. But a stronger argument was in favor of surveying patients; since they are in a vintage position to evaluate what will benefit them.[43]

Table 5: Multiple regression analyses to determine the factors that influence willingness to pay for topical anesthetic cream

Variables	WTP for TAC Coefficient (SE)	Sig	Willing to pay US$6.3 Coefficient (SE)	Sig
Decision-marker (yes and no)	0.088 (0.056)	0.5	0.076 (0.109)	0.5
Number of children (≤3 and≥4)	0.054 (0.054)	0.6	0.007 (0.104)	0.9
Child's age in years (≤2 and≥3)	0.017 (0.057)	0.9	0.002 (0.110)	1.0
No. of painful experiences (≤3 and≥4)	0.143 (0.064)	0.2	0.137 (0.124)	0.3
Rate i.e., severity of pain (≤5 and≥6)	0.008 (0.062)	0.9	0.004 (0.121)	0.9
Quartiles (4 quartile groups *versus* WTP)	0.035 (0.028)	0.8	0.028 (0.054)	0.6

WTP=Willingness to pay; SE= Standard error

Conclusion

Majority of the respondents were willing to pay for TAC. The observed level of WTP for the cream is a good indicator that the cream will be widely accepted if deployed in the health facilities. Thus, policymakers should consider inclusion of TAC in pediatric practice.

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References

1. Wong DL, Baker CM. Pain in children: Comparison of assessment scales. Pediatr Nurs 1988;14:9-17.
2. Prevention and management of pain and stress in the neonate. American Academy of Pediatrics. Committee on Fetus and Newborn. Committee on Drugs. Section on Anesthesiology. Section on Surgery, and Canadian Paediatric Society. Fetus and Newborn Committee. Pediatrics 2000;105:454-61.
3. Anand KJ, Hickey PR. Pain and its effect in the human neonate and fetus. N Engl J Med 1987;317:1321-9.
4. Cardajal R, Veerapen S, Couderc S, Jugie M, Ville Y. Analgesic effect of breast feeding in term neonates: Randomized controlled trial. BMJ 2003;326:13.
5. Kennedy RM, Luhmann J, Zempsky WT. Clinical implications of unmanaged needle-insertion pain and distress in children. Pediatrics 2008;122 Suppl 3:S130-3.
6. Taddio A, Shah V, Gilbert-MacLeod C, Katz J. Conditioning and hyperalgesia in newborn exposed to repeated heel lances. JAMA 2002;288:857-61.
7. Taddio A, Katz J, Ilersich AL, Koren G. Effect of neonatal circumcision on pain response during subsequent routine vaccination. Lancet 1997;349:599-603.
8. Shah V, Taddio A, Ohisson A. Randomised controlled trial of paracetamol for heel prick pain in neonates. Arch Dis Child Fetal Neonatal Ed 1998;79:F209-11.
9. Friedman PM, Mafong EA, Friedman ES, Geronemus RG. Topical anesthetic update: EMLA and beyond. Dermatol Surg 2001;27:1019-26.
10. Kozer E, Rosenbloom E, Goldman D, Lavy G, Rosenfeld N, Goldman M. Pain in infants who are younger than 2 months during suprapublic aspiration and transurethral bladder catherization: A randomized controlled study. Pediatrics 2006;118:e51-6.
11. Kaur G, Gupta P, Kumar A. A randomized trial of eutectic mixture of local anesthetics during lumbar puncture in newborns. Arch Pediatr Adolesc Med 2003;157:1065-70.
12. Koren G. The eutectic mixture of local anesthetics: Changing the risk-benefit ratio in pediatric research. IRB 1992;14:4-6.
13. Ali AA, Thorbecke E. The state and path of poverty in Sub-Saharan Africa: Some preliminary results. J Afr Econ 2000;9:9-40.
14. World Bank. World Development Indicators. Washington DC: World Bank; 2013. data.worldbank.org
15. United Nations Development Programme (UNDP). International Human Development Indicators; 2013.hdrstats.undp.org
16. Walsh BM, Bartfield JM. Survey of parental willingness to pay and willingness to stay for "painless" intravenous catheter placement. Pediatr Emerg Care 2006;22:699-703.
17. Willingness to pay. Available from: http://en.wikipedia.org/wiki/Willingness_to_pay [Last accessed on 2013 Aug 15].
18. Diener A, O'Brien B, Gafni A. Health care contingent valuation studies: A review and classification of literature. Health Econ 1998;7:313-26.
19. Klose T. The contingent valuation method in health care. Health Policy 1999;47:97-123.
20. Bhatia MR, Fox-Rushby JA. Willingness to pay for treated mosquito nets in Surat, India: The design and descriptive analysis of a household survey. Health Policy Plan 2002;17:402-11.
21. Whitehead M. The concepts and principles of equity and health. Int J Health Serv 1992;22:429-45.
22. Mooney G. What does equity in health mean? World Health Stat Q 1987;40:296-303.
23. Uzochukwu BS, Onwujekwe OE, Nguru NP, Ughasoro MD, Ezeoke OP. Willingness to pay for rapid diagnostic tests for the diagnosis and treatment of malaria in southeast Nigeria: Ex-post and ex-ante. Int J Equity Health 2010;9:1.
24. Onwujekwe OE, Shu EN, Nwagbo D, Akpala CO, Okonkwo PO. Willingness to pay for community-based ivermectin distribution: A study of three onchocerciasis-endemic communities in Nigeria. Trop Med Int Health 1998;3:802-8.
25. Onwujekwe O, Shu E, Chima R, Onyido A, Okonkwo P. Willingness to pay for the retreatment of mosquito nets with insecticide in four communities of southeastern Nigeria. Trop Med Int Health 2000;5:370-6.
26. Uzochukwu BS, Onwujekwe OE. Altruistic willingness to pay for family planning services: A study in southeast Nigeria. Niger J Community Med Prim Health Care 2003;15:47-56.
27. Tinuade O, Iyabo RA, Durotoye O. Health-care-seeking behavior for childhood illnesses in a resource-poor setting. J Paediatr Child Health 2010;46:238-42.
28. Wagstaff A. Socioeconomic inequalities in child mortality: Comparison across nine developing countries. Bull World Health Organ 2000;78:19-29.
29. Makinen M, Waters H, Rauch M, Almagambetova N, Bitran R, Gilson L, *et al.* Inequalities in health care use and expenditures: An empirical data from eight developing countries and countries in transition. Bull World Health Organ 2000;78:55-65.
30. Onwujekwe O, Hanson K, Fox-Rushby J. Inequalities in purchase of mosquito nets and willingness to pay for insecticide-treated nets in Nigeria: Challenges for malaria control interventions. Malar J 2004;3:6.
31. Whittington D, Smith K, Okoroafor A, Okore A, Liu JL, McPhail A. Giving respondents time to think in contingent valuation studies. A developing country application. J Environ Econ Manage 1992;22:205-25.
32. Onwujekwe O, Shu E, Okonkwo P. Can community leaders' preferences be used to proxy those of the community as a whole? J Health Serv Res Policy 1999;4:133-8.
33. Montgometry MR, Gragnolati K, Burke KA, Paredes E. Measuring living standards with proxy variables. Demography 2000;37:155-74.
34. Cortinovis I, Vela V, Ndiku J. Construction of a socio-economic index to facilitate analysis of health in data in developing countries. Soc Sci Med 1993;36:1087-97.
35. Filmer D, Pritchett LH. Estimating wealth effect without expenditure data--or tears: An application to educational enrollments in states of India. Demography 2001;38:115-32.
36. Olusanya O, Okpere E, Ezimohkal M. The importance of social class in voluntary fertility control in a developing country. West Afr J Med 1985;4:205-11.
37. Oyedeji GA. Socioeconomic and cultural background of hospitalised children in Ilesa. Nig J Paediatr 1995;12:111-7.
38. Garber J, Van Slyke DA, Walker LS. Concordance between mothers' and children reports of somatic and emotional symptoms in patients with recurrent abdominal pain or emotional disorders. J Abnorm Child Psychol 1998;26:381-91.
39. Lopes AB, Galleta DF. Consumer perceptions and willingness to pay for intrinsically motivated online content. J Manage Inf Syst 2006;23:203-31.
40. Parvez E, Stinson J, Boon H, Goldman J, Shah V, Taddio A. Mothers' beliefs about analgesia during childhood immunization. Paediatr Child Health 2010;15:289-93.
41. Cho-Min-Naing, Lertmeharit S, Kamol-Ratanakul P, Saul AJ. Ex post and Ex ante willingness to pay (WTP) for the ICT malaria pf/pv test kit in Myanmar. Southeast Asian J Trop Med Public Health 2000;31:104-11.
42. O'Brien B, Gafni A. When do the "dollars" make sense? Toward a conceptual framework for contingent valuation studies in health care. Med Decis Making 1996;16:288-99.
43. Johannesson M. A note on the relationship between ex ante and expected willingness to pay for health care. Soc Sci Med 1996;42:305-11.

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