

RESEARCH COMMUNICATION

Impact of Income and Education on Drug Purchasing Decisions in Hong Kong Chinese Cancer Patients: a Pilot Study

WM Chan¹, J Mak², RJ Epstein^{1,2,3*}

Abstract

Background: The affordability of diagnostic, preventive and therapeutic interventions is a global concern, particularly in the developing world. To clarify the educational and financial factors that influence purchasing decisions, we conducted a survey of Hong Kong cancer patients across a broad social spectrum. **Methods:** A questionnaire was designed to assess the effect of costs on purchasing decisions relating to six drug-related variables: efficacy, tolerability, convenience, safety, peer pressure, and uncertainty. Validation of the original 31-part survey resulted in a final set of 22 core questions that was administered to 51 consecutive oncology patients who were characterised in terms of varying household income and educational level. **Results:** Most respondents (87.6%) were Hong Kong-born or mainland Chinese. There was a strong correlation between household income and education. Demand for drug tolerability and safety was high and cost-inelastic across all educational and income groups. An unexpected finding was that patients from low-income/education households were keen to purchase costly medications (whether Western, or Chinese herbs) of reputed high efficacy, whereas patients from middle-income/-education backgrounds were more negatively influenced by considerations of cost. Only the most affluent and well-educated patients valued overall survival above disease-free survival when making drug purchasing decisions; this cohort was also the least influenced by peer pressure, and the most willing to pay extra for drugs offering more convenience alone. **Conclusion:** Low-income/education Asian patients had paradoxically high expectations of costly drug interventions. Although larger studies addressing this issue are needed to confirm these conclusions, public education initiatives aimed at protecting low-income/education patients from exploitation or disappointment may be desirable.

Keywords: Cost-efficacy - decision analysis - psycho-oncology - cancer patients

Asian Pacific J Cancer Prev, 12, 2093-2096

Introduction

Health care is expanding at an exponential rate in Asia, creating both opportunities and threats (Epstein, 2007). Inevitably, rising expectations of health care outcomes will clash with relatively low incomes and a weak third-party payment infrastructure. The lack of strong government funding of public medicine also correlates with a low level of regulation, however, with correspondingly less reliance on evidence-based medicine (Epstein, 2010). In theory, these circumstances create potential for abuse: professionals entrusted with knowledge and skill sets related to health care may promote their wares to those who lack such knowledge with impunity (Sadan, 2002). Indeed, the commercial success of the herbal medicine industry – which far exceeds the evidence for its cost-efficacy – attests to the reality of this threat (Chiu et al., 2009). This is a complex area of ethics, involving as it does the different statistical ways that treatment benefits may be scientifically presented (Nadler et al., 2006) and/or interpreted (Matsuyama et al., 2006), and the

psychological value of offering patients positive and/or holistic options (Shumay et al., 2001) when no standard treatment may yet be of proven value (Verhoef et al., 2005).

In this pilot study we have sought to clarify whether the financial or educational status of cancer patients in Hong Kong affects decision-making relating to drug purchases. To this end, a questionnaire was designed in which drugs were said to vary in terms of six main factors: either efficacy, safety, tolerability, convenience, peer pressure, or uncertainty. Here we present the survey results, and discuss the need for further research in this area.

Materials and Methods

Patients were first characterized by profiling of age, sex, ethnicity, occupation, financial status and disease characteristics (available as Supplementary Materials on request).

A draft 31-item questionnaire was generated using questions designed to address seven component variables

¹Division of Haematology & Oncology, Department of Medicine, Queen Mary Hospital, The University of Hong Kong, Pokfulam,

²Hong Kong Sanatorium & Hospital, Happy Valley, Hong Kong, ³Department of Oncology, St Vincent's Hospital, Sydney, Australia

*For correspondence: repstein@stvincents.com.au

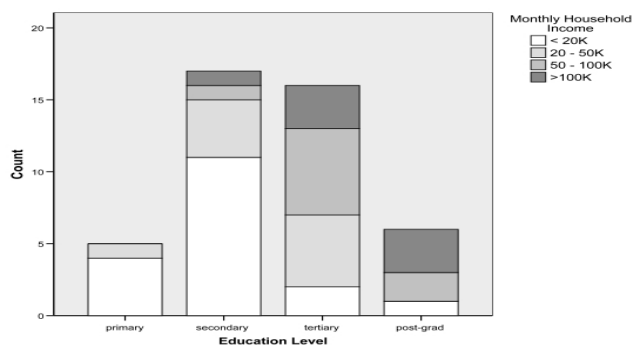


Figure 1. Demographic Correlation Between Educational Status and Income Level in the Surveyed Patient Cohort.

postulated to affect purchasing decisions: (i) perceived drug efficacy (e.g., curativity vs. noncurativity), (ii) tolerability (nausea, hair loss, fatigue vs. not), (iii) safety (e.g., acute complications, death, second malignancy), (iv) convenience (e.g., IV vs. oral, weekly vs. monthly), (v) peer pressure (e.g., novelty, fashion, faith), (vi) uncertainty (e.g., randomization, placebo-controlled, early-phase), and (vii) reimbursement and/or insurance status. The English version of the questionnaire was translated into Chinese, and reverse-translated from Chinese into English, with no detectable change in meaning.

Multiple questions on each component were incorporated into this draft questionnaire. Reimbursement status was dropped as a criterion due to insufficient numbers of patients (< 10%) with meaningful coverage by third-party payers. Validation of the remaining dataset was then sought by two methods: first, by assessing the comprehensibility of each question by direct interview of subjects; and second, by comparing the predicted consistency of each answers to each question within its component (data not shown). This resulted in the discarding of 14 questions, leaving a core questionnaire of 22 questions (available as Supplementary Materials on request) across the six components.

Results

As expected, educational level and household income proved to be positively correlated, with postgraduate-

Table 1. Absolute Scores Quantifying the Extent to Which Each Factor Influenced the Cost-dependency of Drug Purchasing Decisions for All Patients

Score	Mean	SEM
Efficacy	2.31	0.40
Tolerability	2.27	0.32
Safety	1.67	0.26
Convenience	0.80	0.26
Uncertainty	-0.12	0.34
Peer pressure	-0.29	0.40

SEM, standard error of mean

educated patients being represented disproportionately in the high-income bracket (Figure 1). For the overall patient cohort, the extent to which any one variable component influenced cost-related drug purchasing decisions was quantified by determining the proportion of positive and negative responses. As shown in Table 1, this analysis suggested that decisions in general tended to be most influenced by considerations of treatment efficacy (overall multiplier 2.31) or tolerability (overall multiplier 2.27), and least influenced by peer pressure or uncertainty, as defined above.

When stratified by educational level (Table 2), little education-specific difference was evident for the influence of tolerability or uncertainty on purchasing decisions. Efficacy appeared to be most important at the extremes of the educational distribution, i.e., for primary-only educated individuals (multiplier 3.60) and for postgraduates (multiplier 3.86). Considerations of drug safety seemed most important for primary-level educated patients (3.00) and least important for postgraduates (1.00). Compared to less educated respondents, postgraduate-educated patients were more influenced by convenience (1.43) and less influenced by peer pressure (-1.29).

When stratified by household income, similar trends were seen (Table 3). The influence of efficacy on purchasing decisions was again maximal at the two extremes of the income distribution, monthly income < HK\$20K (multiplier 3.05) and monthly income > HK\$100K (multiplier 3.00), replicating a U-shaped relationship (Figure 2). Convenience was again most highly influential at the highest end of the income distribution (multiplier 1.38), whereas other trends were

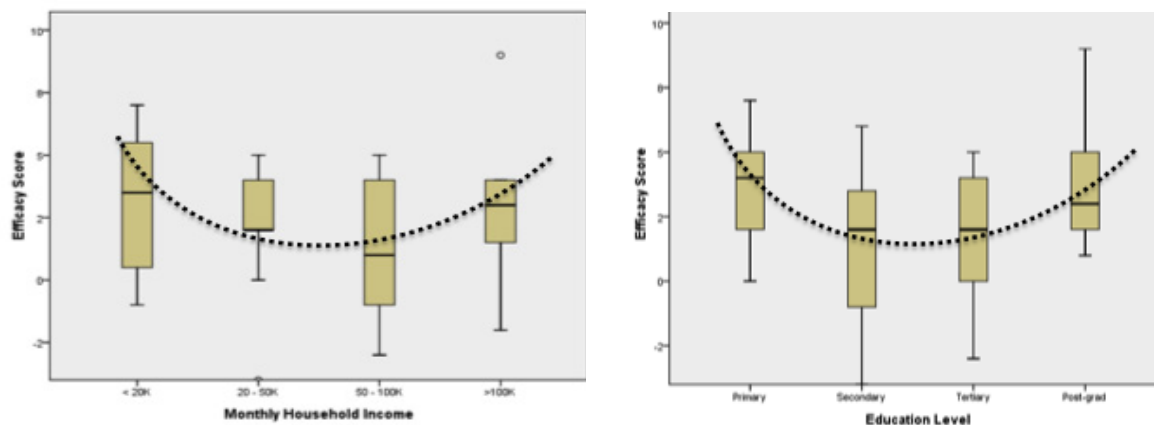


Figure 2. Influence of Perceived Drug Efficacy on Purchasing Decisions, Showing an Unexpectedly Increased Importance of this Variable for Decision-Making in the Least Affluent and Least Educated Cohort

Table 2. Mean Scores by Education Level

Education Level		Efficacy Score	Tolerability Score	Safety Score	Convenience Score	Peer Pressure Score	Uncertainty Score
Primary only	N=5 Mean	3.60	2.60	3.00	0.80	0.00	-0.60
	SEM	1.21	1.03	0.45	1.16	1.73	1.47
Secondary only	N=19 Mean	1.63	2.11	1.37	0.68	-0.26	0.74
	SEM	0.69	0.56	0.49	0.36	0.57	0.41
Tertiary only	N=17 Mean	2.12	2.47	1.94	0.94	0.18	-0.65
	SEM	0.62	0.63	0.35	0.47	0.66	0.49
Post-grad	N=7 Mean	3.86	2.29	1.00	1.43	-1.29	-0.29
	SEM	1.08	0.61	0.82	0.69	1.21	1.25
Total	N=48 Mean	2.33	2.31	1.69	0.90	-0.23	-0.04
	SEM	0.41	0.33	0.27	0.26	0.40	0.33

SEM, standard error of mean

Table 3. Mean Scores by Income Level

Monthly Household Income		Efficacy Score	Tolerability Score	Safety Score	Convenience Score	Peer Pressure Score	Uncertainty Score
< 20K	N=20 Mean	3.05	2.95	1.80	1.15	0.10	-0.10
	SEM	0.61	0.36	0.41	0.34	0.67	0.57
20 - 50K	N=10 Mean	1.90	2.00	1.10	0.50	-0.80	-0.20
	SEM	0.80	0.79	0.77	0.69	0.84	0.73
50 - 100K	N=9 Mean	1.22	1.67	1.44	-0.22	-0.78	-0.22
	SEM	0.98	1.03	0.34	0.70	1.21	0.78
>100K	N=8 Mean	3.00	2.62	2.25	1.38	-0.75	0.00
	SEM	1.13	0.80	0.77	0.63	0.84	1.04
Total	N=47 Mean	2.45	2.45	1.66	0.79	-0.40	-0.13
	SEM	0.41	0.33	0.28	0.27	0.42	0.36

SEM, standard error of mean

Table 4. Comparison of Mean Scores Between Monthly Income Groups

	Monthly income	N	Mean	SEM	Independent samples T test
Efficacy Score	20-100K	19	1.58	0.61	t=-1.71; P=0.09
	< 20K	20	3.05	0.61	
Tolerability Score	20-100K	19	1.84	0.62	t=-1.56; P=0.12
	< 20K	20	2.95	0.36	
Safety Score	20-100K	19	1.26	0.43	t=-0.91; P=0.35
	< 20K	20	1.80	0.41	
Convenience Score	20-100K	19	0.16	0.49	t=-1.70; P=0.98
	< 20K	20	1.15	0.34	
Peer Pressure Score	20-100K	19	-0.79	0.70	t=-0.92; P=0.36
	< 20K	20	0.10	0.67	
Uncertainty Score	20-100K	19	-0.21	0.52	t=-0.14; P=0.88
	< 20K	20	-0.10	0.57	

SEM, standard error of mean

less clear than with educational status. As shown in Table 4, an unplanned subset analysis of lowest-income vs. middle-income patients revealed a near-significant difference for efficacy (p = 0.09). For the same subsets, in contrast, there was no difference in influence for uncertainty (p = 0.88) or convenience (p = 0.98).

Discussion

The central finding of this pilot study is the counterintuitive observation that Hong Kong cancer patients characterised by low-income and/or low-education status appear more strongly influenced in their purchasing decisions by positive perceptions of drug efficacy than are middle-income or secondary/tertiary-educated patients. If

so, this trend may be more specific for Hong Kong and/or East Asian cultures than for other communities. Demand for potentially curative medical treatment of serious illness has long been known to be relatively cost-inelastic even in impoverished communities such as Sri Lanka (Akin et al., 1998) and India (Sarma, 2009). The present study suggests further that in the ethnic Chinese community of Hong Kong, demand is not merely cost-inelastic but paradoxically increased in those patient cohorts with least means. This suggests an exaggerated faith in the logic that either (i) the market value of a therapeutic intervention at least reflects, or even underestimates, its curativity, or (ii) perception of greater efficacy justifies a disproportionate, even limitless, investment in the context of a life-threatening illness.

The present study indicates that these latter convictions are not shared by middle-income and/or better-educated patients. Hence, one explanation is that low education gives rise to unrealistic expectations about drug treatments for diseases that are frightening or serious. Since most of China has a fee-for-service healthcare system (Ma, 2008), with little in the way of a welfare-based safety net for cancer treatment (Wan et al., 2010), the belief that potentially lethal diseases are always best treated with high-cost drugs may hold greater sway than in healthcare systems with less inequity.

We acknowledge that our study is limited by its small size and consequent lack of statistical power. Nonetheless, the hypothesis raised is a testable and important one for oncology health services in the Asia-Pacific region. In particular, it raises the possibility that private-sector oncology services could encounter potential conflicts of

interest arising from unrealistic expectations of relatively impoverished and uninformed patients. We submit that improved public cancer education – focusing in particular on prevention and early detection, rather than on ‘magic bullet’ success stories for advanced disease – may be needed to avoid future healthcare dissatisfaction and social unrest in Asian countries (Blumenthal et al., 2005).

Acknowledgements

We thank Ms S. Chan for assistance with the data. No funding was provided for this study. The authors confirm that there is no financial conflict, nor disclosures relevant to this work. WM Chan collected the data, assisted with translation, and helped with the manuscript. S Chan and J Mak organised the data and statistical analyses. RJE designed the study and wrote the manuscript.

References

- Akin JS, Guilkey DK, Hutchinson PL, McIntosh MT (1998). Price elasticities of demand for curative health care with control for sample selectivity on endogenous illness: an analysis for Sri Lanka. *Health Econ*, **7**, 509-31
- Blumenthal D, Hsiao W (2005). Privatization and its discontents--the evolving Chinese health care system. *N Engl J Med*, **353**, 1165-70
- Chiu J, Yau T, Epstein RJ (2009). Complications of traditional Chinese/herbal medicines (TCM)--a guide for perplexed oncologists and other cancer caregivers. *Support Care Cancer*, **17**, 231-40
- Epstein RJ (2007). Growth of the Asian health-care market: global implications for the pharmaceutical industry. *Nat Rev Drug Discov*, **6**, 785-92
- Epstein RJ (2010). Digitization and its discontents: future shock in predictive oncology. *Semin Oncol*, **37**, 60-4
- Ma J, Lu M, Quan H (2008). From a national, centrally planned health system to a system based on the market: lessons from China. *Health Aff (Millwood)*, **27**, 937-48
- Matsuyama R, Reddy S, Smith TJ (2006). Why do patients choose chemotherapy near the end of life? A review of the perspective of those facing death from cancer. *J Clin Oncol*, **24**, 3490-6
- Nadler E, Eckert B, Neumann PJ (2006). Do oncologists believe new cancer drugs offer good value? *Oncologist*, **11**, 90-5
- Sadan B. Patient empowerment and the asymmetry of knowledge (2002). *Stud Health Technol Inform*, **90**, 514-8
- Sarma S. Demand for outpatient healthcare: empirical findings from rural India (2009). *Appl Health Econ Health Policy*, **7**, 265-77
- Shumay DM, Maskarinec G, Kakai H, Gotay CC (2001). Why some cancer patients choose complementary and alternative medicine instead of conventional treatment. *J Fam Pract*, **50**, 1067
- Verhoef MJ, Mulkins A, Boon H (2005). Integrative health care: how can we determine whether patients benefit? *J Altern Complement Med 11 Suppl*, **1**, S57-65
- Wan YC, Wan YI (2010). Achievement of equity and universal access in China's health service: a commentary on the historical reform perspective from the UK National Health Service. *Glob Public Health*, **5**, 15-27