

Economic impact of urinary incontinence and pelvic organ prolapse in women in Belize

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Introduction: Urinary incontinence (UI) and pelvic organ prolapse (POP) are prevalent in low-income and middle-income countries (LMIC). Although the significant clinical and social impacts of UI/POP are well-described, less is known regarding their microeconomic impacts. This study aimed to assess the microeconomic impact of UI/POP in the LMIC country of Belize.

Methods: The authors performed a prospective survey-based assessment of patients with urologic disease during surgical trips to Belize in 2019–2021 by the charity Global Surgical Expedition. This study is a post-hoc analysis focused on a subset with urogynecologic disorders. Patients completed a 17-item survey focused on disease impact on work, caretaker responsibilities, and finances. The primary study outcome was income loss resulting from work impairment or absence related to UI/POP, calculated using the validated work productivity and activity impairment questionnaire.

Results: Forty-nine women with UI ($n = 15$) and POP ($n = 34$) completed surveys. The majority (73% UI; 88% POP) reported their condition negatively impacted their lives. In the analysis of 21 patients able to provide financial data, 6 (29%) patients reported missing work and 10 (48%) reported impairment at work due to UI/POP. This resulted in a loss of 6.7% (UI) and 8.5% (POP) in total income per capita. When also accounting for direct treatment costs, the total cost attributable to UI/POP was 28% (2%, 51%) of weekly income.

Conclusions: In Belize, UI and POP significantly impair work and caretaking responsibilities, resulting in considerable lost income and cost. Efforts are thus necessary to provide surgical care for UI/POP in LMIC to address not only the quality of life but also the financial health of individuals and families.

Keywords: global surgery, microeconomic impact, pelvic organ prolapse, urinary incontinence

Introduction

Global burden of surgical disease

In 2015, the Lancet Commission on Global Surgery (LCGS) estimated that five billion people lack access to safe and affordable surgical care^[1]. As surgical disease is estimated to comprise up to one third of the global burden of disease, this lack of surgical access results in an estimated 17 million annual deaths,

notable life years of life lost and life lived with disability, and a significant reduction of quality of life (QOL)^[2,3]. In an effort to promote surgical infrastructure development across low and middle income countries (LMIC), the LCGS identified core indicators of surgical care access including specialist work force density and surgical volume metrics^[1]. Notably, the LCGS core indicators included the risk of catastrophic expenditure from surgical care^[4].

Economic impact of surgical disease

This focus on the economic impact of surgical disease is important. On a macroeconomic level, the LCGS estimated that LMIC economies will lose an estimated \$12.3 trillion USD related to unmet surgical disease over 15 years^[1,5]. Similarly, Alkire and colleagues estimated that surgical disease may result in GDP losses of up to 2.5% through 2030 using value of lost output modeling across numerous LMICs^[6].

In contrast to macroeconomic estimates, little is known regarding the microeconomic impacts of surgical disease to individuals or households. These microeconomic impacts not only occur through direct costs of healthcare expenses, but also indirectly through primary (inability to work, loss of productivity) and secondary mechanisms (inability of the caretaker to work). Available research demonstrates a significant deleterious economic impact to individuals related to untreated surgical disease through loss of work ability or medical expenditures^[7,8]. Indeed, although focus on preventing the profound morbidity, mortality, and disability

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associated with untreated surgical disease is paramount, prevention of financial devastation associated with surgical disease is equally important^[2,3].

Urogynecologic disease in LMICs

At the same time, surgical urogynecologic disease (UD) is highly prevalent in LMIC^[9]. The significant clinical and social impacts of pelvic floor disorders such as urinary incontinence (UI) and pelvic organ prolapse (POP) are well described and associated with significant deterioration in QOL, depression, and social isolation^[10,11]. More recently, focus has also been placed on the vast economic cost of UI^[12]. Despite this, there is limited research to understand the microeconomic impact of UI and POP to individuals or households in LMIC. This data is critical as surgical care is generally an extremely cost-effective intervention and paramount as we seek to optimize cost-effective approaches to treat surgical disease^[13–15]. We conducted a survey assessment in Belize to understand the impact of urologic disease on work and caretaking responsibilities and to quantify the microeconomic impact to affected individuals.

Methods

We conducted a survey-based assessment of the microeconomic impact of urologic disease in Belize. We have previously reported study results demonstrating that a variety of urologic diseases are associated with a significant level of potential lost income^[16]. This study represents a post-hoc analysis focused on the subset of patients with urogynecologic disorders.

Patients were recruited during three consecutive visiting surgical trips (2019–2021) by the Global Surgical Expedition (GSE). GSE is a medical charity that provides surgical care internationally to populations in need. Since 2012, GSE has provided nearly 400 urologic and urogynecologic surgeries in Belize and Rwanda to help treat surgical disease. Belize was selected as the study site given its poverty level, the observed prevalence of UD, and the lack of urologic surgical care access. In addition, study feasibility and recruitment were aided in Belize given GSE's longstanding programming specific to urogynecology and referring/collaborating local providers. Belize is a LMIC located in Central America with a population of 400 000. According to Belizean governmental data, 5731 operations were performed in the country in 2018, none of which were urologic surgeries performed by domestic urologists.

In summary of the recruitment procedure, prospective surgical candidates are initially seen during a large triage clinic held at trip initiation. As part of this clinical evaluation, all adult patients diagnosed with a urologic diagnosis are approached for study inclusion. Patient found to have nonurologic diagnoses were excluded. Inclusion criteria also included the ability to understand survey questions and translation services were available as necessary. No identifying protected health information was collected in an effort to maintain patient anonymity and patient responses were not seen by the evaluating urologists. Furthermore, the evaluating urologist was not alerted to whether patients chose to participate in the study. This was done in an effort to assure patients that their choice to participate or any answers provided in the survey would not impact their treatment by the urologic providers.

Following consent, patients completed a 17-item survey with a focus on the impact of UD on work and caretaker responsibilities as well as finances. The complete questionnaire is presented in Supplemental Material (Supplemental Digital Content 1, <http://links.lww.com/IJSGH/A30>). The primary survey component was the 6-item Work Productivity and Activity Impairment Questionnaire: Specific Health Problem (WPAI:SHP), which was included in the study survey^[17]. The WPAI:SHP is a validated assessment tool designed to assess the financial and QOL impacts of a given medical condition^[18]. It provides quantitative measures of reduced productivity, both at work and during nonwork activities, and has been previously used to assess the impact of urologic conditions^[17–19]. Accordingly, the WPAI:SHP was used to determine the primary study outcome, income loss resulting from work impairment or work time missed resulting from the participant's UD. The primary outcome of income loss due to UD was calculated by multiplying the overall work impairment due to UD (as determined by the WPAI:SHP) by the patient-reported weekly income in Belizean Dollars (BZD). Secondary outcomes included percent work time missed, work impairment, and overall work impairment due to UD as measured through WPAI:SHP.

Additional items were included to gain insight on related patient characteristics, including patient profession and time spent working, caretaking responsibilities, and perceived impact of patient UD on work, caretaker, or regular daily nonwork activities.

Statistical analyses

The present analysis represents a subset analysis of the overall data set for patients with broad urologic disease (e.g. cancer, urolithiasis) and includes only those patients diagnosed with UI (including overactive bladder) or POP. Descriptive statistics were performed to assess overall cohort characteristics, including diagnosis, household role, number of dependents, employment type, and questionnaire responses regarding the impact of UD on work and caregiving. Patients who did and did not provide financial information for the survey were also analyzed separately and compared.

Primary and secondary outcomes were analyzed across the entire cohort, as well as based on presenting diagnosis (UI vs. POP).

Data are presented as median (interquartile range) or *n* (%) as appropriate. Post-hoc, mean (SD) was utilized to summarize per capita income loss due to UD for the overall financial cohort to better communicate population-level income losses, as the median was skewed to 0. Cohort comparisons were made using χ^2 , Fisher's exact, and Wilcoxon rank sum tests, as appropriate, using $\alpha = 0.05$. Monetary figures are presented in Belizean dollars (BZD), with 1 USD ~ 2 BZD. All statistics were formed using the R programming language (3.6.1).

Ethics statement

Study approval was obtained by the University of Virginia Institutional Review Board (IRB-SBS Protocol 2561). The study was also approved by a local ethics official for the participating site (Corozal Community Hospital, Northern Regional Health Care Administration).

Results

Patient characteristics

One hundred fourteen patients completed survey assessments between 2019 and 2021. Of these, 49 (42%) had a diagnosis of UI or POP and were included for analysis. Cohort characteristics are presented in Table 1. A total of 19 (35%), 8 (16%), and 17 (39%) respondents reported themselves as being head of household, a worker, or a caregiver, respectively. The overall cohort reported a median of 2.0 (0.0, 3.0) dependents. Characteristics did not differ based on UD; however, respondents who provided financial information were less likely to identify as a caregiver (19 vs. 54%, $P=0.02$) and more likely to report full-time employment (57 vs. 0%, $P<0.001$).

Patient-reported impact of UD on work and caretaking responsibilities

Patient-reported impacts of UD on work or caretaking responsibilities are presented in Table 2. The majority (UI, 73%; POP, 88%) of patients reported a negative impact of their UD. More patients with UI reported negative impact related to time off work (40 UI vs. 12% POP, $P=0.049$). Conversely, more patients with POP reported pain as a cause for negative impact, although it did not reach statistical significance (71 POP vs. 47% UI, $P=0.12$). Patients with POP reported higher impairment of nonwork daily activities related to their UD as well, although not statistically significant (50 POP vs. 0% UI, $P=0.07$). Notably, the majority of patients in both groups (79 UI, 94% POP) reported that treatment of their UD would improve their ability to care for their family or perform their job. Responses did not differ between financial and nonfinancial information cohorts.

Economic impact of UD

Of 49 patients, 21 (43%) were working on a regular basis and were able to provide sufficient financial data for analysis. Of these, 12 reported being full-time employees. Table 3 demonstrates the WPAI and financial analysis. Six (29%) patients reported missing work due to the UD. Patients who missed work reported missing a median of 13^[6, 20] hours. Ten (48%) patients reported impairment while working due to their UD, with a median percent impairment 50% [42.5%, 77.5%]. Among

Table 1
Cohort characteristics.

	Overall cohort <i>n</i> = 49
Diagnosis	
UI	15 (30.6)
POP	34 (69.4)
Household role	
Head	17 (34.7)
Caregiver	19 (38.8)
Worker	8 (16.3)
Dependents	2.0 [0.0, 3.0]
Paid employment	
Full-time	12 (24.5)
Part-time	6 (12.2)
Day-to-day	6 (12.2)

Data presented as *n* (%) and median (IQR). POP, pelvic organ prolapse; UI, urinary incontinence.

Table 2
Questionnaire responses on impact of urogynecologic disease on work and caregiving.

	All patients <i>n</i> = 49	UI <i>n</i> = 15	POP <i>n</i> = 34	<i>P</i> *
Negative impact on life	41 (83.7)	11 (73.3)	30 (88.2)	0.39
Impact on ADLs (%)	40 [0, 70]	0.0 [0, 45]	50 [0, 77.5]	0.07
Problems caring for family	13 (26.5)	2 (13.3)	11 (32.4)	0.29
Cause for negative impact				
Pain	31 (63.3)	7 (46.7)	24 (70.6)	0.12
Embarrassment	22 (44.3)	6 (40.0)	16 (47.1)	0.76
Time off work	10 (20.4)	6 (40.0)	4 (11.8)	0.049
Time for doctor's visits	19 (38.8)	6 (40.0)	13 (38.2)	1.00
UD treatment would improve family care or job performance	43 (87.8)	26 (78.6)	32 (94.1)	0.28

Data presented as median (IQR) or *n* (%), as appropriate. ADLs, activities of daily living; POP, pelvic organ prolapse; UI, urogynecologic disease; UI, urinary incontinence. *Compares UI and POP cohorts.

patients reporting missed and/or impaired work, overall work impairment (missed work + impairment at work) was 67% [52%, 80%].

Median weekly income was \$214.5 (\$175, \$483) BZD. The percent overall work impairment resulted in a mean \$18.5(37.7) BZD (UI) and \$25.0(39.7) BZD (POP) per capita in lost potential income per week. This represents a loss of 6.7% (UI) and 8.5% (POP) of total income attributable to UD. Among patients who missed work due to their UD, losses were higher at \$84.6 (\$71, \$94), or 37.5% income loss. The median weekly cost for UD treatment was \$13 (\$0, \$70) BZD for the overall cohort, and was \$20 (\$5, \$70) BZD for the financial cohort. The median weekly cost attributed to UD (lost income + treatment cost) was thus \$70 (\$5, \$150), or 28% (2%, 51%) of weekly income within the financial cohort.

Table 3
Work and financial impairment related to urologic disease.

	All patients <i>n</i> = 21	UI <i>n</i> = 9	POP <i>n</i> = 12	<i>P</i> *
Missed any work, <i>n</i> (%)	6 (28.6)	2 (22.2)	4 (33.3)	0.94
Work missed, hours	0.0 [0.0, 2.0]	0.0 [0.0, 0.0]	0.0 [0.0, 2.8]	0.72
None	/	/	/	
Missed work	13.0 [6, 23]	21.0 [19.5, 22.5]	6.5 [4.25, 12.5]	0.36
% Impairment at work	0.0 [0.0, 50]	0.0 [0.0, 40]	30.0 [0.0, 58]	0.25
% Overall work impairment	0.0 [0.0, 59]	0.0 [0.0, 40]	40.0 [0.0, 64]	0.27
Income (BZD)	214.5 [175, 483]	214.5 [200, 250]	225.0 [156, 487]	0.75
Income loss (BZD)	0.0 [0.0, 35]	0.0 [0.0, 0.0]	0.0 [0.0, 47]	0.66
None	/	/	/	
Missed work	84.6 [71, 94]	83.3 [75, 92]	84.6 [71, 88]	0.64
% Income loss	0.0 [0.0, 6.9]	0.0 [0.0, 0.0]	0.0 [0.0, 9.6]	0.66
None	/	/	/	
Missed work	37.5 [22, 48]	41.7 [38, 46]	29.7 [15, 45]	0.64

Data presented as median [IQR] unless otherwise specified. Work hours and income are weekly values. Missed work hours and income loss include subanalysis of cohort of patients reporting having missed any work due to urogynecologic disease. POP, pelvic organ prolapse; UI, urinary incontinence. *Compares UI and POP cohorts.

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Discussion

Our study demonstrates several important findings. First, UI and POP negatively impact the ability of Belize women to work through both time off work and also impairment of work capacity while at work. This is underscored by the significant portion of respondents (29%) citing the need to take time off work related to their pelvic floor disorders. Specific to POP, even when able to attend work, impairment of productivity was significantly reduced.

Second, our data demonstrate that UD have a significant and deleterious economic impact on Belizean women as a result of work loss or impairment. The mean percent potential income loss per capita for UI and POP was 6.7 and 8.5%, respectively. Critically, overall cost including lost income and direct treatment costs totaled 28% of weekly income. This amount represents a significant portion of respondents' income and contributes to the real risk of impoverishment in these women. Combined, these findings are important, especially given the perception by many that the impact of UI and POP is mostly to a woman's QOL. Indeed, our data suggest a much greater impact to include financial health as well.

Our data support the argument that the global health community should place increasing priority on the surgical treatment of UI and POP given the economic benefits associated with treatment. The majority of patients in both groups reported that treatment of their UD would improve their ability to care for their family or perform their job, supporting that efforts to treat UI and POP can have a meaningful impact. Much of the focus underlying the call for global surgical care access relates to the vast mortality and morbidity associated with untreated surgical disease^[1,21]. Certainly, the enormous deleterious impacts of pelvic floor disorders (such as UI or fistula) are well described in LMIC and support the need for global initiatives to improve the delivery of corrective surgeries^[9,22]. At the same time, it is also understandable that attention is often more so focused on acute surgical disease (including trauma and surgical infection) that can be highly morbid or fatal. It is for this reason that more recent attention on the equally important economic consequences of surgical disease is critical. In short, we must consider not only how surgical access may prevent morbidity and mortality, but also its potential to prevent poverty.

Such attention on understanding the economic consequences of surgical disease is seen throughout research and policy efforts, with an important focus on the microeconomic impacts to individuals and households. A study demonstrates that surgical disease in LMIC is associated with significant financial strain to individuals related to the costs of surgical care (direct impacts)^[20,23]. Importantly, research also demonstrates indirect economic impacts of disease related to disability and a reduction in work time or performance^[24–27].

These significant microeconomic impacts serve as a framework to understand the income loss associated with UI and POP seen in our study. Catastrophic health expenditure (CHE) is generally defined as health care payments exceeding a household's ability to pay^[28]. A variety of thresholds for CHE have been forwarded, including direct medical costs exceeding 10% of monthly household income^[28,29]. Although CHE is commonly used as a metric based on direct out of pocket costs, it nonetheless serves as a context to understand the significant consequences associated with the nearly 9% potential income loss seen in our study. This is underscored by recent data estimating that 13.9% of the Belize population lives on less than \$1.90 per day and the 52 and 13% of persons live in poverty and critical poverty, respectively^[30,31].

Critically, our data also demonstrate the deleterious impact of UD to caretakers, with 33% of women with POP reporting resultant problems caring for family. Although our study was not designed to quantify the economic loss associated with this finding, it is likely significant. Indeed, a majority reported that UD treatment would improve family care or job performance. Family members provide childcare in a significant proportion of LMIC households and the worldwide lack of childcare and resultant implications to work ability and personal finances are well described^[32]. In addition, numerous studies also show that family members in LMICs commonly serve as elderly caregivers (informal caretakers)^[33,34]. Combined, these data support that caretaker activities are crucial to the economic health of LMIC households as they allow other family members to work. As such, the time required for physician appointments or health care disability related to UI or POP can have a significant economic impact through secondary impacts. This likely impact is supported by an economic study in various LMICs showing that, following hospitalization for cardiovascular disease, up to 19% of patients reported decreased work time by family members^[26].

Combined, our findings support important deleterious indirect economic impacts to UI and POP. These findings are important given that a limited study exists to understand the economic impact of pelvic floor disorders in LMIC. Furthermore, the study focused on indirect economic impacts as it related to disease moreover more commonly focuses on direct impacts, such as payments for health services.

Our study is limited by patient number. Feasibility issues related to the COVID-19 pandemic limited recruitment. Like most international global health organizations, GSE suspended surgical trips in 2020. Under guidance regarding reinstating in-country trips, GSE was able to resume trips in fall 2021 but again suspended in the spring 2022 due to issues associated with the Omicron variant. Recruitment was thus limited to three trips total. Furthermore, our survey sample included those being evaluated by GSE for free surgical care rather than a general population. Accordingly, this may bias results towards more severe cases of UI and POP and also selects for a population of lower economic status. Finally, our survey sample was captured from a single hospital and thus cannot be generalized more broadly to other regions or countries.

There are numerous opportunities for future research and also clinical programming. Certainly, further study is also needed to better understand the prevalence of UI and POP in Belize and numerous other LMICs. Extending on the present data, more study on the economic impact of surgical disease is needed, including study designed to quantify to indirect economic loss associated with caretaker disability related to UI and POP. As we seek to improve access to surgical care worldwide, investigation is needed to understand the cost-effectiveness of surgical treatment for surgical disorders and also how effective they are in helping patients in LMIC avoid the financial catastrophe associated with unexpected health care expenditures. Finally, there are exciting clinical programming and related research opportunities focused on developing nonsurgical programs that might help to avoid the need for surgery. For example, we are currently developing a physical therapy program in Belize in an effort to provide sustainable therapy services that might treat PFD and avoid the need for surgery. In doing so, we hope that such effort may not only serve to improve QOL and reduce morbidity, but can also have a significant economic impact to individuals affected by PFD as well.

Ethical approval and consent to participate

Study approval was obtained by the University of Virginia Institutional Review Board (IRB-SBS Protocol 2561). The study was also approved by a local ethics official for the participating site (Corozal Community Hospital, Northern Regional Health Care Administration).

Consent for publication

Not applicable.

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Conflicts of interest disclosure

D.R. is president of Global Surgery Expedition. The remaining authors declare that they have no financial conflict of interest with regard to the content of this report.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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