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RESEARCH ARTICLE

Health service utilization and adherence to medication for hypertension and diabetes among Syrian refugees and affected host communities in Lebanon

Emily Lyles[1] · Gilbert Burnham[1] · Lara Chlela[2] · Paul Spiegel[1] · Laura Morlock[3] · The Lebanon Health Access Survey (LHAS) Study Team[1] · Shannon Doocy[1]

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Abstract

Methods This study uses data from a 2015 household survey of Syrian refugees and Lebanese host communities. A total of 1,376 refugee and 686 host community households were surveyed using a cluster design with probability proportional to size sampling. Differences in outcomes of interest by population group were examined using Pearson's chi-square and t-test methods and the crude and adjusted odds of care-seeking and interrupted medication adherence among Syrian refugees were estimated using logistic regression.

Results Findings identified significant gaps between refugees and host community members in care-seeking, health facility utilization, out-of-pocket payments for care, and medication interruption. While host community members had better access to care and fewer reports of medication interruption compared to refugees, out-of-pocket spending for the most recent care visit was significantly higher among host community care-seekers. Refugee care-seekers most frequently received care at primary health facilities, choosing to do so mainly for reasons related to cost, whereas host community care-seekers predominantly utilized private clinics with greater concern for quality and continuity of care.

Conclusion Further efforts are needed to facilitate lower and more predictable health service costs for refugees and vulnerable host community members, as is continued communication on available subsidized care.

Purpose To characterize care-seeking, health service utilization and spending, and medication prescribing and adherence for hypertension and diabetes among Syrian refugees and host communities in Lebanon.

Keywords Syria · Lebanon · Refugee health · Health care utilization · Adherence

Introduction

The influx of more than one million Syrian refugees since 2011 placed Lebanon as host to the highest number of refugees per capita worldwide [1, 2]. Contrary to the traditional model of providing refugee health care through a parallel system, refugee care is instead integrated into Lebanon's existing health system [3–5]. The impact of this approach has been considerable strain on the country's health system, particularly given the high prevalence of chronic non-communicable diseases (NCDs) in Lebanese and Syrian populations [6, 7].

At the time in which this survey was conducted (2015), care was available for vulnerable Lebanese for reduced costs at primary healthcare centers (PHCCs) in the Lebanese Ministry of Public Health's (MoPH) National Network and Syrian refugees could utilize subsidized primary care (US$2–3) at 116 of over 1,200 existing PHCCs/dispensaries

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✉ Emily Lyles
elyles2@jhu.edu

[1] Department of International Health, Johns Hopkins Bloomberg School of Public Health, 615 N Wolfe Street, Baltimore, MD 21205 , USA

[2] Médecins du Monde, Beirut, Lebanon

[3] Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

[3, 5, 6, 8–10]. Medication for chronic conditions is also provided to refugees for US$0.67 at more than 400 facilities through the Young Men's Christian Association (YMCA) chronic medications program [11, 12].

Refugees meeting eligibility criteria are also entitled to United Nations High Commissioner for Refugees (UNHCR) coverage of referral care; however, Lebanon's highly privatized health system still often makes care for refugees as expensive as for Lebanese [7, 13, 14]. Alternative financing mechanisms such as a flat fee model including bundled services for a nominal predetermined fee are being explored, though are in pilot or early scale-up phases [15–17]. The burden of out-of-pocket payments can be sufficient to prevent many refugees and vulnerable Lebanese from receiving care. This barrier is substantial considering the increasing debt and strained financial situation of many refugee households [6, 7]. Despite wide coverage of subsidized care, 39% of Syrian refugees in Lebanon are reportedly not receiving needed care due to treatment and medication costs [18].

There is a paucity of research exploring care-seeking rates in the Lebanese population; previous studies focus primarily on treatment rates, often defined by use of antihypertensive or antidiabetic medication(s) [19]. Effective management of hypertension and type 2 diabetes often also require adherence to pharmacological intervention to mitigate poor health outcomes and increased long-term health costs [20–23]. The diversity of measures applied across studies hinders comparison of reported adherence rates and there is no established standard for ideal population-level adherence prevalence empirically associated with health outcomes [20, 24, 25]. The only identified estimate for Syrian refugees' adherence to chronic disease medications was among beneficiaries in a 2018 evaluation of NCD services offered by Médecins Sans Frontières (MSF) in Irbid, Jordan, 89% of whom had high adherence, though non-adherence was much higher based on qualitative results [26].

This paper aims to fill these evidence gaps by providing empiric evidence on health service utilization, spending, and medication adherence for hypertension and diabetes by Syrian refugees and host communities in Lebanon.

Methods

Data source

A national survey of Syrian refugees and affected host communities in Lebanon was conducted in March and April 2015 to characterize health access and utilization. Survey methods presented here are abbreviated from detailed methods published elsewhere with main survey findings [27–30]. Detailed sample size calculation, sampling and questionnaire design, as well as survey implementation methods are available in the survey's published technical report [27].

Sample size was determined for key objectives based on the most conservative prevalence estimate of 50% assuming 80% power and a design effect of 2.0. The planned sample was increased from a minimum of 900 refugee households to 1,400 refugee households and 700 host community households to improve precision. A 100-cluster x 21-household (14 Syrian refugee households and seven host community households) design was applied. Clusters were assigned to cadastrals using probability proportional to size (PPS) sampling with UNHCR registration data, assuming similar residence patterns in non-registered refugees. Permission could not be obtained to conduct the survey in 22 cadastrals, requiring PPS reassignment of 28 clusters. The final sample included 35 clusters in the North governorate, 34 in Bekaa, 25 in Mount Lebanon, four in Beirut, and two in the South (Fig. 1). Analyses exclude South governorate clusters due to violation of sampling assumptions. The final sample included 2,062 households (1,376 Syrian refugee and 686 Lebanese) for a response rate of 93.6%.

Cluster start points were randomly allocated to populated areas within cadastrals using ArcGIS. At the start point, interviewer pairs went in different directions to approach the nearest business or resident(s) for referral to nearby Syrian households. Upon interview completion, respondents were asked for referral to the nearest Syrian household; this referral process was used until 14 Syrian refugee interviews were completed. Following every two interviews with Syrian

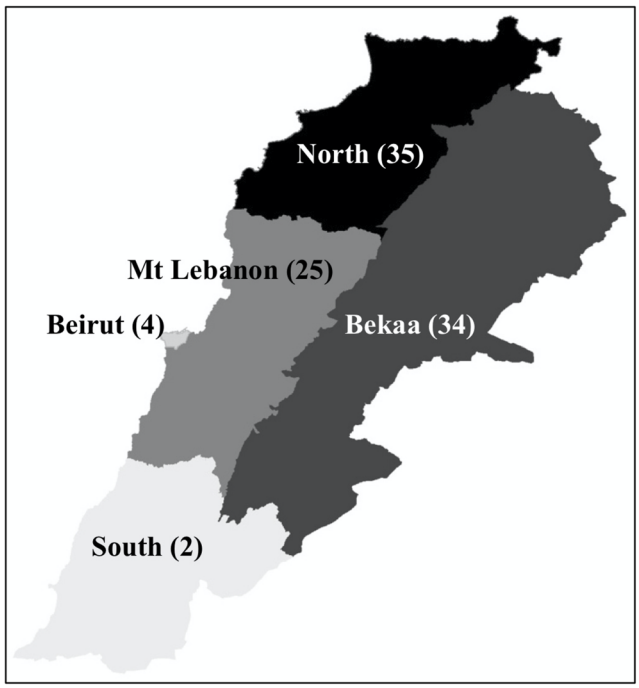

Fig. 1 Survey cluster assignment by governorate

households, the nearest Lebanese household was identified and interviewed. If no one was home in the identified household or if no interview could be conducted due to absence of an appropriate household decision maker, refusal to participate, or if the household was already interviewed, this household was recorded with the appropriate reason for not completing an interview and a second referral was requested from the previously interviewed household.

For start points in informal settlements, the settlement was divided and assigned to different interviewers. Interviewers counted the number of shelters between the middle of the settlement and the edge in a random direction, selected starting households using a random number between one and the number of shelters passed, and used interval sampling.

Lebanese host community households were sampled using a neighborhood approach (i.e., households were selected based on proximity to included Syrian households) with no additional exclusion criteria. Only Syrian households arriving in Lebanon after 2010 were eligible to participate. Families with Lebanese and Syrian members were considered refugees if they came from Syria after 2010 and host community if they had never lived in Syria.

The questionnaire was initially developed for use in Jordan and adapted for Lebanon. Questions focused on health service utilization, access, and barriers to care. Respondents were asked about the five chronic conditions most prevalent in the Syrian refugee population (including hypertension, diabetes, cardiovascular diseases, chronic respiratory diseases, and arthritis) using one household index case for each condition. Index cases were identified through self-reported diagnosis of the condition from a health professional. If more than one household member had a given condition, one individual was randomly selected and asked a series of questions on health service utilization, their most recent care visit, and medication use for the condition. Interviewers received two days of classroom training on the questionnaire, e-data collection, interview techniques, human subjects' protection principles, and sampling followed by two days of field training. Interviews lasted between 30 and 60 minutes. Data was collected on tablets using the Magpi mobile data platform (Washington, DC). No unique respondent identifiers were recorded and verbal consent was obtained.

The study was approved by the Institutional Review Board at the American University of Beirut. The Johns Hopkins Bloomberg School of Public Health (JHSPH) Institutional Review Board determined that because they did not have direct contact with participants or access to personal identifiers, the JHSPH team was not involved in human subjects research.

Variables

Outcome variables of interest included care-seeking and medication adherence. Care-seeking was assessed for household index cases of hypertension and diabetes based on questions about their most recent care visit for the condition. Care-seeking was analyzed binarily as whether the most recent visit was within the six months preceding interview. This time period reflects the distribution of care-seeking timing in the data and is the most conservative recommended follow-up interval for adults with elevated blood pressure per the 2017 ACC/AHA guidelines for blood pressure management [31]. Medication adherence was assessed binarily based on whether or not index cases reported stopping medication for two weeks or longer in the prior year. Explanatory variables included individual and household characteristics (Supplementary Tables 1 and 2).

Data analysis

Data were analyzed using Stata 13 (College Station, TX). Descriptive statistics and visual displays were examined to characterize missingness and distributions of variables to determine the analytical strategy's appropriateness. Variance inflation factor scores for explanatory variables were all below 1.75, indicating no multicollinearity concerns relative to conventional thresholds. Differences in care utilization, spending, and medication use by population group were examined using Pearson's chi-square and t-test methods. *P*-values and 95% confidence intervals were obtained accounting for cluster effects using the Rao and Scott second-order corrected Pearson statistic for dichotomous variables and adjusted F-statistics for continuous variables [32]. Given the fundamental differences between hypertension and diabetes and their potential effect on outcomes of interest, care-seeking and adherence were modeled separately for each condition.

Due to insufficient reports of interrupted medication adherence among Lebanese cases to support modeling (8.6% for hypertension; 8.5% for diabetes), regression analyses included only Syrian refugees. This also permitted inclusion of refugee-specific variables likely to be useful for program refinements.

The crude and adjusted odds of care-seeking and interrupted medication adherence were estimated using logistic regression. Interaction terms for key explanatory variables were tested *in toto* and with sequential addition; however, Akaike and Bayesian Information Criterion indicated preference for the null model excluding all interaction terms.

Results

The final analyzed survey sample included 2,062 households (1,376 Syrian refugee and 686 Lebanese) for a response rate of 93.6%. An overview of household-level background characteristics among sampled households with at least member with hypertension and diabetes is provided in Supplementary

Table 3; greater background on the overall survey sample is also available in previous publications [27–30].

Care-seeking and health service utilization

Hypertension

Care-seeking for hypertension was high among both Syrian refugees and Lebanese host community members. Of 282 refugee hypertension index cases, most saw a doctor for hypertension in Lebanon (80.9%, CI: 75.2–85.5%), 64.5% (CI: 58.5–70.1%) did so in the preceding six months, and 51.4% (CI: 45.2–57.6%) within the past three months (Table 1). Similar to refugees, many Lebanese cases sought care for hypertension in the past six months (72.9%, CI: 66.1–78.7%) and 55.1% (CI: 48.4–61.6%) did so within the past three months.

Care-seeking location significantly differed between refugees and Lebanese ($P < 0.001$). Most refugees receiving care for hypertension visited primary health facilities (54.9%), while over half of Lebanese hypertension care-seekers visited private clinics (59.2%), a significantly larger proportion than in refugees (21.5%) ($P < 0.001$).

The most commonly reported reasons for selecting the most recent hypertension care location also differed between refugees and Lebanese (Table 1; Fig. 2; $P < 0.001$). Refugees selected facilities primarily for cost-related reasons (65.6%) whereas only 17.9% of Lebanese care-seekers selected facilities for financial reasons, reflected in their higher utilization of private clinics. Lebanese care-seekers selected facilities largely for care quality/continuity (49%).

The primary reason for facility selection also significantly differed between refugee and Lebanese cases when stratified by facility type (primary health facilities and private clinics $P < 0.001$) (Fig. 2), suggesting that population differences in reasons for selecting care locations are not entirely driven by underlying differences in facility types utilized. Cost was the most commonly reported motivation for both refugee (92.5%, CI: 85.6–96.3%) and Lebanese (60.5%, CI: 43.0-75.7%) primary health facility care-seekers. Only nominal proportions of refugee primary health facility care-seekers reported other motivations; larger proportions of Lebanese cited care quality/provider continuity (15.8%, CI: 7.7–29.6%) and location (15.8%, CI: 6.7–32.8%). Among hypertension care-seekers utilizing private clinics, quality/continuity was the leading motivation both for refugees (47.6%, CI: 32.0-63.7%) and Lebanese (69.0%, CI: 58.6–77.7%). Smaller proportions selected private clinics for location (refugees = 26.2%; Lebanese = 14.7%), and cost (refugees = 19.1%; Lebanese = 1.7%).

Diabetes

Care-seeking for diabetes was also high among Syrian refugees and host Lebanese. Among 136 diabetes index cases in refugee households, most received care for the condition in Lebanon (88.2%, CI: 81.8–92.6%). Many refugees sought care within the past six months (71.3%, CI: 63.6–78.0%) or in the past three months (61.8%, CI: 53.8–69.2%). Like refugees, most of the 144 Lebanese diabetes cases sought care in the past six months (82.6%, CI: 75.9–87.8%), and many within the past three months (66.0%, CI: 58.3–72.9%) (Table 1).

Diabetes care-seeking locations also significantly differed between by population group ($P < 0.001$). More than half of refugees seeking diabetes care utilized primary health facilities (60.8%, CI: 50.7–70.1%) compared to only 17.5% (CI: 12.1–24.5%) of Lebanese, who most commonly utilized private clinics (59.5%, CI: 51.2–67.3% vs. 20.6%, CI: 13.7–29.7% of refugees) (Table 1). Like hypertension care, care-seeker characteristics were similar by facility type and sector for both populations.

Reasons for selecting diabetes care facilities were distributed similarly to those for hypertension with significant differences between refugees and host communities (Table 1; Fig. 2; $P < 0.001$). Refugees most frequently selected facilities for financial reasons (78.4%, CI: 69.1–85.5%) and care quality/provider continuity was the leading motivation among Lebanese care-seekers (50.8%, (CI: 42.1–59.4%).

Refugees and Lebanese still differed in the motivations that led them to seek diabetes care when stratified by the type of facility (primary facilities $P < 0.001$; private clinics $P = 0.009$) (Fig. 2). Refugee primary health facility care-seekers were predominantly motivated by cost (93.6%, CI: 83.7–97.6%) compared to only 50.0% (CI: 29.9–70.1%) of Lebanese. The remaining Lebanese primary facility care-seekers were motivated by perceived care quality/provider continuity (22.7%, CI: 9.6–44.8%) and location (27.3%, CI: 12.6–49.4%). Refugees seeking diabetes care at private clinics also did so largely because of cost (47.6%, CI: 26.7–69.4%), with smaller proportions driven by quality/continuity (23.8%, CI: 10.3–46.0%). Lebanese private clinic care-seekers were largely motivated by perceived quality/provider continuity (68.0%, CI: 55.1–78.6%).

Predictors of care-seeking

Table 2 presents results of univariate and multivariate logistic regression analyses of predictors of care-seeking for hypertension and diabetes in the preceding six months among Syrian Refugees. Adjusted odds of hypertension care-seeking were significantly associated only with region of residence; refugees in the North governorate had 1.94 times higher odds of care-seeking (CI: 1.01–3.73) than those in Beirut/Mount Lebanon ($P = 0.046$). Refugees in the Bekaa had marginally

Table 1 Care-seeking for hypertension and diabetes

	Hypertension				Diabetes			
	Syrian Refugees		Host Community		Syrian Refugees		Host Community	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Last time care sought[a]		*n = 282*		*n = 236*	*n = 136*		*n = 144*	
< 1 month ago	26.2	(21.3–31.9)	25.0	(20.1–30.6)	33.1	(25.2–42.1)	25.7	(19.0-33.7)
1–2 months ago	25.2	(20.4–30.7)	30.1	(24.8–35.9)	28.7	(21.7–36.9)	40.3	(32.7–48.4)
3–6 months ago	13.1	(9.4–18.0)	17.8	(13.5–23.1)	9.6	(5.8–15.3)	16.7	(11.2–24.0)
7 months − 1 year ago	4.6	(2.6-8.0)	10.2	(6.9–14.7)	3.7	(1.5–8.5)	4.9	(2.4–9.6)
> 1 year ago	11.7	(8.1–16.6)	15.3	(10.9–20.9)	13.2	(8.7–19.6)	9.7	(5.7–16.0)
Never sought in Lebanon	18.4	(13.8–24.2)	0.4	(0.1-3.0)	10.3	(6.2–16.6)	0.7	(0.1–4.9)
P-value[b]	***< 0.001***				0.126			
Saw a doctor in Lebanon[c]	80.9	(75.2–85.5)	98.3	(95.6–99.4)	88.2	(81.8–92.6)	97.2	(92.9–98.9)
P-value[b]	***< 0.001***				**0.005**			
Most recent care location[c]		*n = 195*		*n = 196*	*n = 102*		*n = 126*	
Primary level facility	54.9	(47.6–61.9)	19.4	(14.3–25.7)	60.8	(50.7–70.1)	17.5	(12.1–24.5)
Private clinic	21.5	(16.6–27.5)	59.2	(51.0-66.9)	20.6	(13.7–29.7)	59.5	(51.2–67.3)
Hospital	8.2	(5.1–12.9)	15.8	(11.4–21.6)	3.9	(1.5–9.9)	15.9	(10.7–22.8)
Pharmacy	9.2	(5.6–14.8)	2.6	(1.0-6.1)	9.8	(5.5–16.8)	6.3	(3.3–12.0)
Other	6.2	(3.0-12.3)	3.1	(1.2–7.5)	4.9	(2.1–11.1)	0.8	(0.1–5.6)
P-value[b]	***< 0.001***				***< 0.001***			
Reason for selecting location[c]		*n = 195*		*n = 196*	*n = 102*		*n = 126*	
Low cost consultation	48.2	(40.5–56.0)	11.2	(7.6–16.3)	59.8	(50.0-68.9)	13.5	(8.1–21.5)
Free consultation	17.4	(13.0-22.9)	6.6	(3.8–11.3)	18.6	(12.4–27.0)	7.1	(3.8–12.9)
Like quality/family doctor	13.8	(9.4–19.9)	49.0	(40.8–57.2)	7.8	(4.1–14.6)	50.8	(42.1–59.4)
Closest to residence	12.8	(8.5–18.8)	15.3	(10.4–21.9)	9.8	(5.4–17.1)	16.7	(10.8–24.8)
Availability of services	2.1	(0.8–5.3)	11.2	(7.1–17.3)	2.0	(0.5–7.6)	7.9	(4.0-15.2)
Medical emergency	2.6	(1.1–6.1)	4.6	(2.3–9.1)	1.0	(0.1–6.8)	2.4	(0.8–7.2)
Other	3.1	(1.0-9.2)	2.0	(0.8–5.3)	1.0	(0.1–6.9)	1.6	(0.4–6.3)
P-value[b]	***< 0.001***				***< 0.001***			

[a] As percent of household index cases reporting hypertension or diabetes diagnosis

[b] Group comparison using Pearson's chi-square for proportions. Statistical significance indicated in bold ($P < 0.05$) and bold italics ($P < 0.001$).

[c] As percent of household index cases receiving care in Lebanon for the condition in the year prior to interview

significantly lower odds of diabetes care-seeking (0.35, CI: 0.12–1.01) compared to refugees in Beirut/Mount Lebanon ($P = 0.053$).

Spending on health services

Self-reported care costs were collected for the most recent visit among cases who sought care for hypertension or diabetes in the preceding year. Costs included out-of-pocket payment(s) for consultation, diagnostics, and laboratory tests, but excluded those for medication or paid on the patient's behalf. Out-of-pocket expenditures are summarized in Fig. 3 and Supplementary Table 4. Costs reflect expenditures reported by care-seekers at PHCCs in MoPH and Ministry of Social Affairs (MoSA) facilities and those operated privately or by non-governmental organizations (NGOs); differentiation of costs between facilities within and outside the MoPH-PHCC network was not possible.

Hypertension

Overall, 66.7% (CI: 59.2–73.4%) of refugee and 77.0% (CI: 70.7–82.3%) of host Lebanese hypertension cases reported out-of-pocket payments (Fig. 3; $P = 0.017$). Average out-of-pocket costs were US$14.4 (CI: 9.8–18.9) for refugees and US$29.5 (CI: 24.8–34.2) for Lebanese ($P < 0.001$). Average

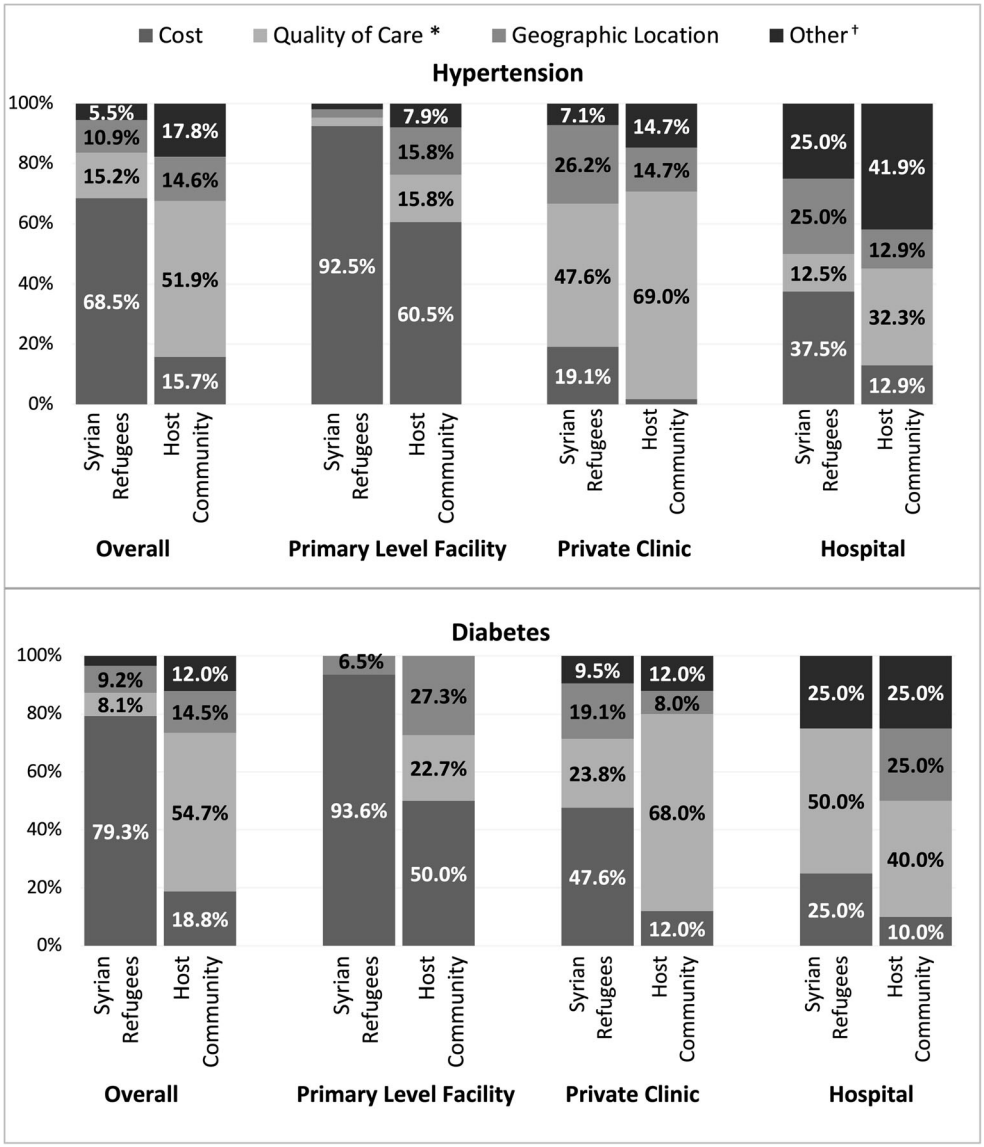

Fig. 2 Reason for selecting most recent hypertension and diabetes care locations by facility type utilized

* Includes perceived quality of care, family doctor, or liking facility staff
† Includes availability of needed services, medical emergency, and "other

costs among those incurring any were US$21.7 (CI: 14.9–28.5) for refugees and US$38.4 (CI: 33.3–43.5) for Lebanese ($P < 0.001$). Significant differences in hypertension care costs by facility type were observed for refugee ($P = 0.001$) and Lebanese care-seekers ($P < 0.001$); for both populations, the highest costs were at hospitals (US$81.4, CI: 29.5-133.2 for refugees; US$69.8, CI: 47.1–92.4 for Lebanese) and the lowest at primary health facilities (US$10.0, CI: 4.6–15.4 for refugees; US$21.7, CI: 12.1–31.2 for Lebanese).

Diabetes

Out-of-pocket payments for diabetes care were reported by 70.6% (CI: 62.3–77.7%) of refugee and 82.5% (CI: 74.5–88.4%) of Lebanese cases ($P = 0.025$). Average out-of-pocket costs were US$12.0 (CI: 8.2–15.7) among refugees and US$31.6 (95% CI 26.7–36.5) among Lebanese ($P < 0.001$). Among those reporting care costs, average amounts were significantly lower for refugees (US$17.1, CI: 12.0-22.2) compared to Lebanese (US$38.7, CI: 33.3–44.0) ($P < 0.001$).

The cost of diabetes care for both refugees and Lebanese was highest at private clinics (US$26.9, CI: 19.7–34.1 for refugees; US$44.2, CI: 38.2–50.2 for Lebanese), significantly greater than at primary level facilities (US$13.5, CI: US$6.8–20.1 for refugees; US$16.5, CI: 9.0–24.0 for Lebanese) (refugee $P = 0.010$; Lebanese $P = 0.015$). Only two refugee cases reported cost amounts for hospital care (both of whom paid US$6.6, presumably reflecting financial support from UNHCR or another organization), barring reliable hypothesis

Table 2 Estimated odds of hypertension and diabetes care-seeking in the preceding six months among Syrian refugees

	Crude OR		Adjusted OR	
	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value
HYPERTENSION				
Region of residence *(ref: Beirut/Mt. Lebanon)*				
Bekaa	1.34 (0.71–2.54)	0.368	1.44 (0.74–2.80)	0.283
North	1.93 (1.01–3.68)	**0.047**	1.94 (1.01–3.73)	**0.046**
Female-headed HH	1.86 (0.91–3.79)	0.088	1.82 (0.88–3.79)	0.105
HH head completed ≥ primary education	0.81 (0.43–1.53)	0.512	1.03 (0.53–1.98)	0.935
Above median monthly HH expenditures[a]	1.34 (0.78–2.29)	0.280	1.32 (0.74–2.35)	0.337
Arrived in Lebanon 2013–2015 *(ref: 2011–2012)*	0.61 (0.37–1.02)	0.060	0.62 (0.37–1.04)	0.072
Receipt of cash and/or voucher assistance[b]	1.16 (0.62–2.16)	0.642	1.12 (0.59–2.11)	0.735
DIABETES				
Region of residence *(ref: Beirut/Mt. Lebanon)*				
Bekaa	0.31 (0.11–0.85)	**0.023**	0.35 (0.12–1.01)	0.053
North	0.57 (0.20–1.58)	0.272	0.59 (0.20–1.74)	0.335
Female-headed HH	2.13 (0.62–7.30)	0.224	2.16 (0.62–7.57)	0.224
HH head completed ≥ primary education	0.86 (0.27–2.68)	0.786	0.90 (0.23–3.44)	0.873
Above median monthly HH expenditures[a]	2.05 (1.03–4.06)	**0.040**	1.79 (0.86–3.74)	0.119
Arrived in Lebanon 2013–2015 *(ref: 2011–2012)*	0.70 (0.34–1.42)	0.314	0.70 (0.34–1.46)	0.337
Receipt of cash and/or voucher assistance[b]	1.42 (0.66–3.05)	0.362	1.58 (0.72–3.48)	0.254

OR = odds ratio; HH = household. Statistical significance indicated in bold ($P < 0.05$) and bold italics ($P < 0.001$).

[a] Relative to median monthly HH expenditures reported by Syrian refugees

[b] Includes cash or voucher assistance received from a United Nations agency, NGO, or other religious or community group in the month preceding interview.

testing. Significant differences in costs between refugees and Lebanese were seen only at private clinics, where average costs were US$26.9 (CI: 19.7–34.1) among refugee and US$44.2 (CI: 38.2–50.2) among Lebanese care-seekers ($P = 0.001$).

Medication prescription and current use

Summaries of medication prescription and interrupted use among index cases of hypertension and diabetes are presented in Table 3.

Hypertension

Among refugee hypertension cases, 97.2% (CI: 94.4–98.6) were prescribed medication for the condition. Many cases reported currently taking hypertension medication (79.4%, CI: 74.4–83.6); however, 27.8% (CI: 22.3–34.1) reported stopping their medication for two weeks or longer in the preceding year without physician instruction. The most common reason refugees stopped hypertension medication was inability to afford the medicine (77.8%, CI: 68.2–85.1).

Medication was prescribed for 99.2% (CI: 96.6–99.8) of Lebanese hypertension cases and most reported currently taking medication (95.8%, CI: 91.9–97.8). Few Lebanese (8.6%, CI: 5.7–12.8) reported stopping hypertension medication for two weeks or longer in the preceding year without instruction from a physician. Like refugees, the most common reason for Lebanese cases' medication interruption was inability to afford the medicine (75.0%, CI: 51.3–89.5). Differences between refugees and Lebanese were significant concerning current medication use ($P < 0.001$) and stopping medication ($P < 0.001$) with refugees having lower adherence than Lebanese.

Diabetes

Nearly all (98.5%, CI: 94.2–99.6) refugee diabetes cases were prescribed medication and most (89.7%, CI: 83.0-93.9) reported currently taking oral hypoglycemic drugs and/or insulin. Of all refugee diabetes cases, 25.0% (CI: 18.4–33.0) reported stopping medication for two weeks or longer in the preceding year without a physician's instruction to do so. Cost remained the most common reason for stopping diabetes medication (76.5%, CI: 57.8–88.5).

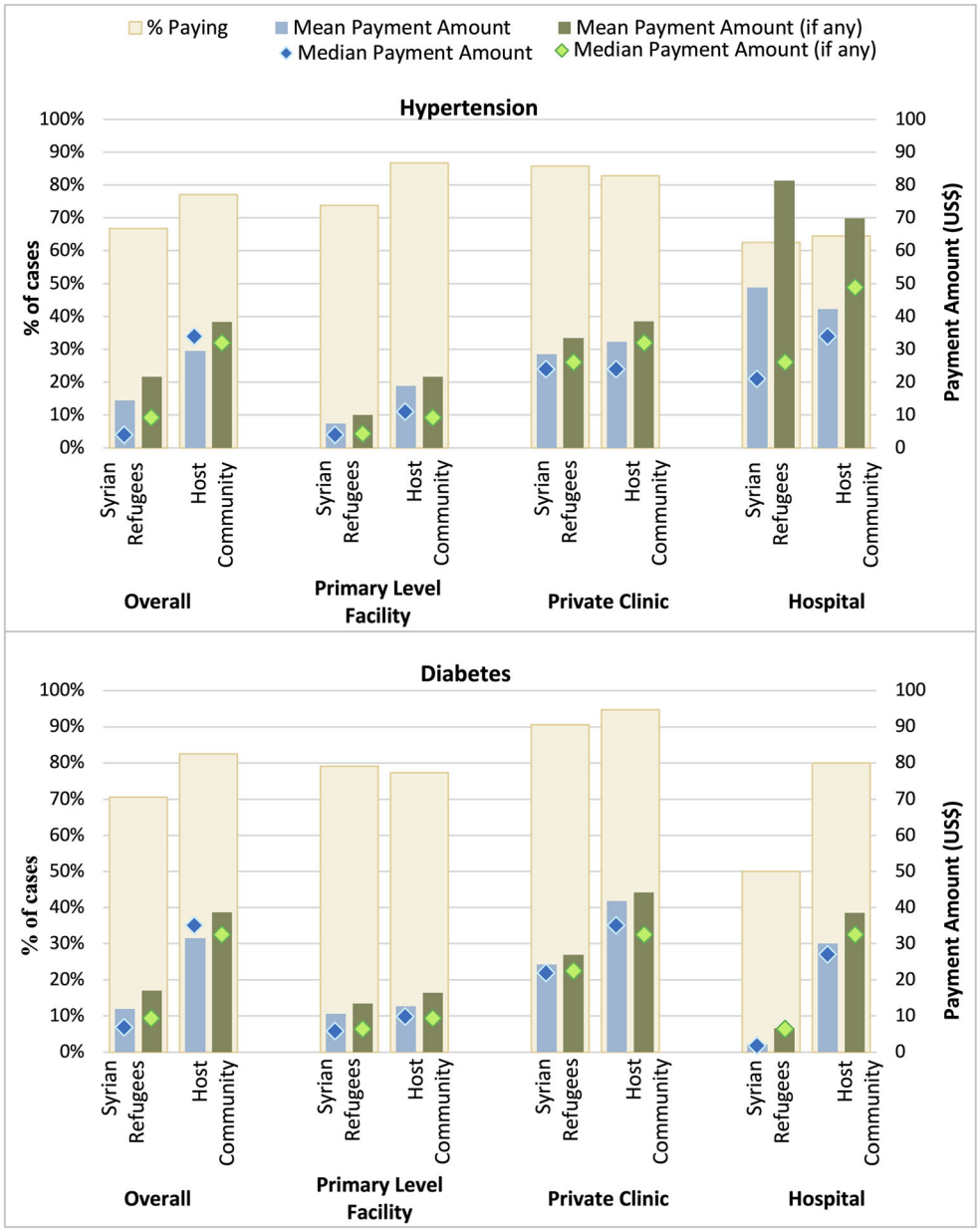

Fig. 3 Out-of-pocket payments for hypertension and diabetes care in Lebanon by facility type utilized

Almost all (97.2%, CI: 92.9–98.9) Lebanese diabetes cases were prescribed medication for the condition and most (95.1%, CI: 90.4–97.6) were currently taking medication. Of all Lebanese diabetes cases, 8.5% (CI: 4.9–14.3) of all cases stopped medication without physician instruction. Again, the most common reason for stopping medication without physician instruction was cost (91.7%, CI: 57.8–98.9); however, unlike with hypertension 25.0% (CI: 9.5–51.3) of diabetes cases who interrupted medication use did so per physician instruction. Significant differences between refugees and host community members with diabetes were observed in stopping medication (any stopping $P = 0.002$; stopping without physician instruction $P < 0.001$), with refugees having lower adherence than Lebanese.

Predictors of interrupted medication adherence

Results of univariate and multivariate logistic regression analyses for predictors of interrupted medication adherence among Syrian refugees are presented in Table 4. Adjusted odds of interrupted adherence to hypertension medication were significantly associated only with having seen a health provider in the preceding three months, which was protective (OR = 0.58, CI: 0.34–0.99) compared to those who did not receive care in that period ($P = 0.046$). Adjusted odds of interrupted adherence to medication for diabetes were significantly associated only with monthly household expenditures. Being in a household with above median expenditures was protective against medication interruption (OR = 0.35; CI:

Table 3 Medication use for hypertension and diabetes

	Hypertension		Diabetes	
	Syrian Refugee	Host Community	Syrian Refugee	Host Community
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Medication Prescription	*(n = 282)*	*(n = 236)*	*(n = 136)*	*(n = 144)*
Ever prescribed medication for condition	97.2 (94.4–98.6)	99.2 (96.6–99.8)	98.5 (94.2–99.6)	97.2 (92.9–98.9)
P-value[a]	0.072		0.453	
Country where prescribed[†]	*(n = 274)*		*(n = 134)*	
Syria	40.1 (33.0-47.7)	---	33.6 (26.4–41.7)	---
Lebanon	59.9 (52.3–67.0)	---	66.4 (58.3–73.6)	---
Currently taking medication[b]	79.4 (74.4–83.6)	95.8 (91.9–97.8)	89.7 (83.0-93.9)	95.1 (90.4–97.6)
P-value[a]	***< 0.001***		0.080	
Interrupted Medication Adherence	*(n = 259)*	*(n = 233)*	*(n = 133)*	*(n = 140)*
Stopped medication for > 2 weeks in past year	30.5 (24.8–36.9)	9.0 (6.0-13.3)	26.3 (19.5–34.6)	11.4 (7.2–17.7)
P-value[a]	***< 0.001***		**0.002**	
Stopped medication for > 2 weeks in past year without physician instruction to do so	27.8 (22.3–34.1)	8.6 (5.7–12.8)	25.0 (18.4–33.0)	8.5 (4.9–14.3)
P-value[a]	***< 0.001***		***< 0.001***	
Where medication was stopped[c]	*(n = 72)*		*(n = 34)*	
Syria	11.1 (5.0–23.0)	---	11.8 (4.6–27.0)	---
Lebanon	88.9 (77.0–95.0)	---	88.2 (73.0-95.4)	---
Reason for stopping medication[d]	*(n = 72)*	*(n = 20)*	*(n = 34)*	*(n = 12)*
Household could not afford	77.8 (68.2–85.1)	75.0 (51.3–89.5)	76.5 (57.8–88.5)	91.7 (57.8–98.9)
Symptoms improved/felt better	6.9 (3.1–15.0)	10.0 (2.4–33.1)	8.8 (3.1–22.7)	8.3 (1.1–42.2)
Did not know where to get it	5.6 (2.1–13.9)	5.0 (0.7–29.1)	0.0 --	0.0 --
Did not like available meds	1.4 (0.2–9.4)	10.0 (2.4–33.1)	0.0 --	0.0 --
Not available	2.8 (0.7–9.9)	0.0 --	5.9 (1.4–21.4)	0.0 --
Other	5.6 (2.1–13.9)	0.0 --	8.8 (2.9–24.2)	0.0 --
P-value[a]	0.348		0.559	

[a] Group comparison using Pearson's chi-square for proportions. Statistical significance indicated in bold ($P < 0.05$) and bold italics ($P < 0.001$).

[b] As percent of household index cases diagnosed with hypertension/diabetes

[c] As percent of refugee index cases who stopped taking medication for > 2 weeks in past year without physician instruction

[d] As percent of all household index cases who stopped taking medication for > 2 weeks in past year

0.14–0.91) compared to households reporting below median expenditures ($P = 0.031$).

Discussion

In the sparsely reported empiric literature on Syrian refugee care-seeking and medication adherence for chronic conditions, findings from this study provide novel population level evidence for practical decisions as Lebanon advances its policies of inclusion and equity in integrating Syrian refugee care into the existing health system. The influx of Syrian refugees into Lebanon since 2011 has strained health system capacity to provide medical care and essential medicines to refugees and host communities alike. This paper presents evidence of significant gaps in health care seeking, utilization, and medication adherence for hypertension and diabetes between Syrian refugees and host communities in Lebanon. These activities are interconnected and potentially influenced by facility type and location, cost relative to a household's ability to pay, perceived care quality, and medical need. While host community members had better access to care and fewer reports of medication interruption compared to refugees, out-of-pocket spending for the most recent care visit was significantly higher among host community care-seekers. Refugee care-seekers most frequently received care at primary health facilities, choosing to do so mainly for reasons related to cost,

whereas host community care-seekers predominantly utilized private clinics with greater concern for quality and continuity of care.

Care-seeking and utilization

Continuous, quality care is essential to effectively managing diabetes and hypertension. As patients experience the two conditions differently, their motivations can be influenced by the silent nature of hypertension versus symptomatic diabetes. Differential prioritization of cost and perceived care quality/provider continuity by refugees and Lebanese suggest the further impact of contextual factors on care-seeking behavior.

Care-seeking for hypertension and diabetes in Lebanon diverged between refugees and Lebanese. Lebanese cases were more likely to seek care than were refugees, and to have done so within the past six months. Although care-seeking is high in both populations, individuals not regularly seeking care for these conditions can experience adverse clinical events that routine care might avoid [33].

Refugee hypertension care-seekers differ from Lebanese in the weight they give to the importance of facility type, cost, quality, and continuity. As refugees most often sought care in primary level facilities, it is not surprising that cost predominantly motivated their treatment decisions. Lebanese cases' concern with care quality, determined by prior care or therapeutic relationships, is consistent with their greater use of private clinics.

Refugees' private clinic care-seeking for cost-related reasons may reflect previously documented misunderstanding about relative costs at primary facilities versus private clinics. Alternatively, they may mistakenly believe that the selected facility provided reduced-cost care [33, 34]. During survey implementation, many respondents could not reliably classify the health facility type they most recently visited. Respondents generally classified PHCCs in the MoPH network and those supported by UNHCR/NGOs as the same, hence their inclusion as a single response option in the final questionnaire. Difficulty identifying facility types may also have extended to misclassifying private clinics and suggests telling evidence of many refugees' vague understanding of available support. This knowledge gap is consistent with refugee knowledge of available services reported in UNHCR's annual Health Access and Utilization Survey (HAUS), which found that in 2014 (the most comparable to the present survey's timing), only 54% of Syrian refugees knew they should pay US$2–3 for consultation at PHCCs [35]. While this has improved, the gap in awareness persists with only 60% of refugees aware of payment amounts in 2018's HAUS [36]. Refugee knowledge that chronic medication is available for a maximum of US$0.66 was much lower, observed in 1% of refugees 2013 and 23.8% in 2014 [35].

In addition to distributing health brochures with information on how to access health care in Lebanon, UNHCR has also increased communication to refugees through numerous other channels [4, 37, 38]. UNHCR has reported improvement in refugees' knowledge of health services and costs since 2013; however, many Syrian refugees remain unaware of available services or healthcare costs. The HAUS and similar studies have consistently reported cost as the prime barrier to refugee care-seeking in Lebanon [35, 36, 39]. Limited or incorrect understanding of healthcare costs may further the influence of inability to afford care on care-seeking.

Spending on health services

Although this work primarily aimed to assess utilization, cost is a central consideration given its role as a primary barrier to care-seeking. The proportion of refugees reporting out-of-pocket payments and their amounts were lower than among Lebanese for both hypertension and diabetes, suggesting that current humanitarian programming may be contributing to maintaining refugee access to NCD care for those aware of subsidized services. The majority of all care-seekers reported some out-of-pocket payments, with an overall lower median cost for Syrian refugees (US$3 for hypertension, US$5 for diabetes) than Lebanese care-seekers (US$33 for both conditions). This difference is likely due to subsidized care at many primary level facilities more commonly utilized by refugees. Payments were reported by a larger proportion of Lebanese care-seekers, consistent with their higher overall costs and use of private clinics. Lebanese care-seekers in this sample reflect those from communities among the most vulnerable and affected by the refugee influx. Such disproportionally higher costs among host communities thus raises concerns about their continued ability to afford needed care.

Among hypertension and diabetes refugee cases, 74% and 72% respectively reported all members currently being registered with UNHCR; 12% in both groups reported some members registered. Median reported consultation costs (US$5 for hypertension, US$7 for diabetes) among refugees reporting any payment at primary health facilities exceed the standard subsidized rate (US$2–3). Only 47% of hypertension care-seekers and 42% of diabetes care-seekers reported paying US$3 or less at primary level facilities, suggesting care-seeking outside facilities providing subsidized services.

Respondents may also have included medication or laboratory testing with consultation costs, resulting in a broader range of payment amounts. Although out-of-pocket costs for consultation and medication for chronic conditions are offered for flat fees, UNHCR proportionally covers 85% of laboratory testing costs with refugees incurring the remaining 15% [5]. In Lebanon's privatized system, testing costs are often unpredictable and can reach unaffordable amounts. Diagnostic costs are subsidized only for designated groups, such as adults 60 years

Table 4 Estimated odds of interrupted medication adherence among Syrian refugees

	Crude OR		Adjusted OR	
	OR (95% CI)	*P*-value	OR (95% CI)	*P*-value
Hypertension				
Any hypertension care in past 3 months	0.59 (0.35-1.00)	0.052	0.58 (0.34–0.99)	**0.046**
Region of residence *(ref: Beirut/Mt. Lebanon)*				
Bekaa	1.04 (0.50–2.15)	0.911	1.00 (0.45–2.20)	0.999
North	1.03 (0.48–2.24)	0.931	1.06 (0.47–2.37)	0.888
Female-headed HH	1.39 (0.67–2.88)	0.367	1.30 (0.58–2.89)	0.523
HH head completed ≥ primary education	0.73 (0.38–1.40)	0.340	0.77 (0.38–1.56)	0.464
Above median monthly HH expenditures[a]	0.86 (0.49–1.52)	0.610	0.94 (0.53–1.66)	0.816
Arrived in Lebanon 2013–2015 *(ref: 2011–2012)*	1.11 (0.66–1.87)	0.682	1.09 (0.65–1.83)	0.738
Receipt of cash and/or voucher assistance[b]	1.26 (0.61–2.59)	0.524	1.28 (0.61–2.71)	0.514
Diabetes				
Any diabetes care in past 3 months	0.72 (0.30–1.74)	0.461	0.81 (0.32–2.07)	0.652
Region of residence *(ref: Beirut/Mt. Lebanon)*				
Bekaa	0.62 (0.22–1.79)	0.374	0.46 (0.14–1.55)	0.209
North	0.66 (0.27–1.59)	0.348	0.62 (0.25–1.56)	0.309
Female-headed HH	0.58 (0.18–1.88)	0.361	0.71 (0.22–2.33)	0.566
HH head completed ≥ primary education	2.52 (0.65–9.72)	0.177	2.29 (0.60–8.70)	0.219
Above median monthly HH expenditures[a]	0.43 (0.17–1.10)	0.076	0.35 (0.14–0.91)	**0.031**
Arrived in Lebanon 2013–2015 *(ref: 2011–2012)*	1.00 (0.41–2.44)	1.000	0.93 (0.36–2.35)	0.869
Receipt of cash and/or voucher assistance[b]	1.60 (0.60–4.26)	0.345	1.85 (0.59–5.82)	0.287

HH = household. Statistical significance indicated in bold ($P < 0.05$) and bold italics ($P < 0.001$).

Interrupted medication adherence is defined as having stopped medication for hypertension/diabetes for two weeks or longer in the preceding year without physician instruction

[a] Relative to median monthly household expenditures reported by Syrian refugees

[b] Includes cash or voucher assistance received from a United Nations agency, NGO, or other religious or community group in the month preceding interview.

and older (among others) [5]. Within Lebanon's pluralistic and fragmented health system, base costs for testing vary considerably across facilities, potentially contributing to individuals not seeking needed care. Instances of delaying or avoiding care-seeking may be prevented through bundled services provided at set costs communicated in advance of care.

The Emergency Primary Healthcare Restoration Project (EPHRP) and the Reducing Economic Barriers to Accessing Health Services (REBAHS) project seek to address the inconsistency and unpredictability of financial barriers to care among refugees and host communities in Lebanon. The World Bank and Lebanese MoPH began the EPHRP in 2016 to "restore access to essential healthcare services for poor Lebanese affected by the influx of Syrian refugees" [16]. Through the end of 2019, the EPHRP piloted an essential health care package for 150,000 limited-income Lebanese in the MoPH network of PHCCs and hospitals. The NCD service package consists of five doctor's visits per year, annual electrocardiogram, lab tests, foot exam, counseling, and medications provided free of charge to enrolled beneficiaries with diabetes and hypertension [17]. By December 2018, over 120,000 patients were enrolled in the project, with 101,454 users, of which 14% received care for diabetes and 20% for hypertension [40].

The REBAHS project began in 2018 led by a consortium of international NGOs (INGOs) to reduce the burden of healthcare costs on "crisis-affected populations" in Lebanon [15]. Like the EPHRP, REBAHS provides support to select PHCCs through subsidized services based on a flat fee model requiring US$2 out-of-pocket patient payment for consultation; remaining visit costs are covered by supporting INGOs. These projects are in early phases and evidence of their impact is not yet available; however, early reports suggest that they are promising models for reforming health financing to facilitate healthcare access for those most in need. Financial support through these projects enables regular, predictable costs to beneficiaries, lessening the potential for devastating expenditures on individuals requiring continuous care. A substantial

increase in demand at participating PHCCs is already apparent; EPHRP monitoring indicated an 88% increase in Lebanese utilization of PHCCs from 2015 to 2017, and a pilot preceding REBAHS reported a 41% increase in care-seekers following flat fee model implementation [15, 41, 42]. Such subsidies should continue to be explored and evidence of their impact documented alongside plans to scale up both projects.

Facility-level support interventions are another essential component for such projects' sustainability. Beyond financial coverage of patient care, these projects reinforce the health system and facilitate improved care through capacity building for enhanced service quality, supply chain management, and in-kind buffer stocks of medicines [8, 15–17]. Facilities' ability to meet increased demands while maintaining care quality relies on support and further funding for increased staffing, maintenance, and operations.

Improving refugee access to affordable healthcare without addressing existing barriers faced by many Lebanese risks furthering interpopulation tensions [43]. Continuation of projects like EPHRP and REBAHS may address both immediate patient needs and development-centered goals of strengthening Lebanon's health system, presenting an opportunity for equitable healthcare access previously not realized for all Lebanese; however, stronger evidence of the projects' impacts are needed to determine their feasibility and effectiveness as alternative models [42].

Medication prescription and adherence

Nearly all hypertension and diabetes cases in this survey were currently taking medication for their condition, though significantly fewer refugees reported current medication use for hypertension compared to Lebanese. Consequently, medication interruption was significantly higher among refugees than Lebanese, yet surprisingly similar between hypertension and diabetes. For both conditions, medication interruption was reported by over one-quarter of refugees, more than three times as high as interruption reported by Lebanese.

Cost was the primary reason for medication interruption in both population groups and conditions, confirming financial burden's role in health decision-making. As with care-seeking, gaps in knowledge about free or low-cost medication may be leading to diversion from prescribed treatment regimens and dosage, or even to foregoing medication altogether when individuals may otherwise adhere to prescribed treatment were they aware of subsidized options. In 2014, only 23.8% of refugees knew that chronic medication prescriptions could be filled for a maximum of US$0.67; however, more recent data are not available [35]. Reported stock-outs or inconsistent availability of medications may also necessitate obtaining medication at private pharmacies where reduced-cost medication is not guaranteed, suggesting an opportunity for intervention to enhance inventory management and drug availability where financial support is provided.

Though care utilization was not significantly associated with interrupted medication adherence for diabetes in our survey, receiving care in the preceding three months was associated with lower odds of medication interruption for hypertension. The discordance in this association could arise from the conditions' pathological differences. Diabetes often presents symptoms that interfere with patients' day-to-day lives, serving as both a reminder and possible motivator for consistent care and treatment compliance. Conversely, hypertension is mostly asymptomatic; in the absence of conspicuous symptoms, health provider visits may serve as a reminder or motivation for treatment compliance. Better management of both conditions may be achieved by promoting regular care.

Limitations

Reliance on UNHCR registration data for sample design and allocation may have introduced sampling bias if registered and unregistered refugees have different geographic distributions. Access restriction necessitated exclusion of large areas of the country; the survey coverage area included only 53% of registered refugees so is not representative of the entire Syrian refugee population. The 2:1 ratio of refugee to host community households was also limiting in instances of rare occurrences. The host community sample was obtained using a neighborhood sampling approach, so reflects communities hosting the largest number of refugees, likely to have lower economic status and different geographic distribution than the broader Lebanese population, hindering generalizability. Within cluster referrals also present a potential for bias; however, households were referred by different respondents and small cluster sizes aimed to attenuate within-cluster similarities and associated design effects.

Respondents' inability to accurately distinguish between facilities providing primary care is another limitation. The complex assortment of primary facilities in Lebanon includes those in the MoPH network, operated by MoSA and local organizations, supported by humanitarian NGOs, and a well-established number of private clinics. A single facility may fall into more than one of these categories, complicating classification for brief household surveys. Despite efforts to develop suitable response categories for primary care facilities, more specific classification lacked adequate reliability so was excluded from the final questionnaire. This survey is not able to differentiate between care-seeking and costs at PHCCs in the MoPH network and other primary level facilities. As such, results are not intended to indicate whether primary health facilities are in the MoPH network or operated/supported by NGOs, MoSA, or private entities.

Additional limitations include the use of self-report for key outcome measures as over-reporting care-seeking and

medication adherence is likely increased due to social desirability and recall biases. Moreover, the single question medication adherence measure captures medication underuse but not explicitly other manners of non-compliance. Finally, the skewed distribution of key variables and notably high overall reporting of medication adherence hinders detection of weaker associations.

Conclusions

This study provides empiric information regarding refugee and host community behaviors for managing hypertension and diabetes. Findings demonstrate significant disparities between these populations in care-seeking, health facility utilization, out-of-pocket payments, and medication interruption. Results show greater access to care, preference for private clinics, and fewer reports of medication interruption in host Lebanese cases. Out-of-pocket spending, however, was significantly higher in Lebanese cases than among refugees, reflecting differential financial support and, potentially, means for affording care. Results also show differences in motivation for selecting treatment locations, with Lebanese cases demonstrating more concern for quality of care and provider continuity while refugees were more cost-sensitive.

The goal of sustainable, high-quality medical care is the same for refugees and host communities in Lebanon. Continuing and new challenges in Lebanon, including COVID-19 and the ongoing economic crisis, necessitate consideration in different domains of health policy, funding models, capacity building, and resource mobilization for sustainable and equitable solutions towards health access for refugees and host communities alike. New models such as flat fee structures may be effective means for achieving this goal and for closing gaps between need and care-seeking practices. Based on the present research, additional efforts are needed to facilitate minimal and predictable out-of-pocket costs for health services and to ensure awareness of subsidized care for refugees and vulnerable Lebanese.

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The LHAS Study Team: The Lebanon Health Access Study Team includes Nour Aridi, Nour Kassab, and Aline Keyrouz from Médecins du Monde; Abla Sibai and Fouad Fouad from the Faculty of Health Sciences at American University of Beirut, Deena Al-Shatti and Francois de La Roche from International Medical Corps, and Michael Woodman from the United Nations High Commissioner for Refugees.

Authors' contributions All authors participated and approved the paper prior to submission. EL led survey implementation, data collection, data analysis, and preparation of the manuscript. LC participated in the study design, helped to refine data-collection tools, and assisted in managing data collection; The LHAS study team members played key roles in the planning, implementation, and management of the study. SD was the principal investigator, led the study design with GB, and advised on implementation and data analysis. GB, PS, LM, and SD contributed to preparation of the manuscript and participated in critical review.

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Data Availability The dataset supporting the conclusions of this article is available in the Humanitarian Data Exchange and can be accessed at: https://data.humdata.org/dataset/ht-dm-care-and-medication-in-lebanon.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval The study was approved by the Institutional Review Board at the American University of Beirut. The Johns Hopkins University Bloomberg School of Public Health Institutional Review Board also reviewed the protocol and determined that members of the JHSPH research team were not involved in human subjects research because they did not have direct contact with participants or access to personal identifiers.

Consent to participate Interviewers obtained verbal informed consent from all participants by reading a consent form in Arabic outlining the purpose of the assessment, intended use of results, confidentiality, and the voluntary nature of participation. Potential respondents were informed that no identifying information would be recorded on the survey instrument or reported and that they had the right to decline to participate, stop the interview at any time, or to decline to answer any question.

Consent for publication Not applicable.

Code availability Not applicable.

References

1. United Nations Development Programme (UNDP), United Nations High Commissioner for Refugees (UNHCR). 3RP regional strategic overview 2019–2020. 2018. Available from: https://data2.unhcr.org/en/documents/download/67370. Accessed 20 Feb 2019.

2. UNHCR. Global trends – forced displacement in 2017. 2018. Available from: https://www.unhcr.org/5b27be547.pdf. Accessed 20 Feb 2019.
3. UNHCR. Health operational guidance L. 2013. Available from: http://data.unhcr.org/syrianrefugees/download.php?id=2257. Accessed 11 Jan 2016.
4. UNHCR. Health - leaflets and posters. https://www.refugees-lebanon.org/en/posters/6/health. Accessed 1 Apr 2019.
5. Ministry of Public Health (MoPH) of Lebanon. Health response strategy: a new approach in 2015 & beyond. 2015. Available from: http://www.moph.gov.lb/userfiles/files/Strategic%20Plans/HRS-DRAFT8.pdf. Accessed 8 Jan 2016.
6. Government of Lebanon. Lebanon Crisis Response Plan 2015–2016. 2014. Available from: http://data.unhcr.org/syrianrefugees/download.php?id=7723. Accessed 3 Sept 2016.
7. World Bank. Lebanon: economic and social impact assessment of the Syrian conflict. 2013. Available from: http://documents.worldbank.org/curated/en/925271468089385165/Lebanon-Economic-and-social-impact-assessment-of-the-Syrian-conflict. Accessed 7 Sept 2016.
8. World Bank. Lebanon - Emergency Primary Healthcare Restoration Project. 2016. Available from: http://documents.worldbank.org/curated/en/185271468266958778/pdf/PAD12050PAD0P15264600PUBLIC00Box391428B.pdf. Accessed 12 Oct 2016.
9. Caritas IM, Corps. Government of Lebanon, United Nations High Commissioner for Refugees. Report on secondary and tertiary health care, January – June 2013. 2013. Available from: https://data.unhcr.org/syrianrefugees/download.php?id=3286. Accessed 9 Jan 2016.
10. UNHCR, Inter-Agency Coordination Lebanon. Lebanon information hub. https://www.dropbox.com/sh/4wqtdgihu566i9m/AABZcfPATVWNsmf6xMkLqUAWa?dl=0. Accessed 8 Jan 2016; 2016.
11. Young Men's Christian Association of Lebanon. YMCA Lebanon Medical Program. 2014. http://ymca-leb.org.lb/program/medical-program-0. Accessed 26 Mar 2019; 2019.
12. HelpAge, International, Handicap International. Gaps in the humanitarian response to the Syrian crisis for persons with disabilities and older people. 2013. Available from: http://www.csa.org.lb/cms/assets/2013/port%20-%20helpage-handicap%20international%20-%20gaps%20in%20the%20humanitarian%20response%20to%20the%20syrian%20crisis.pdf. Accessed 26 Mar 2019.
13. UNHCR. Guidelines for referral health care in Lebanon: standard operating procedures. 2018. Available from: https://data2.unhcr.org/en/documents/details/64586. Accessed 13 Aug 2019.
14. Institute of Health Management and Social Protection. National health statistics report in Lebanon. 2012. Available from: https://www.usj.edu.lb/intranet/annonce/files/pdf/175_pdf_1.pdf. Accessed 14 Sept 2016.
15. Première Urgence Internationale. Reducing Economic Barriers to Accessing Health Services (REBAHS). 2019. Available from: https://www.premiere-urgence.org/wp-content/uploads/2019/02/Project-presentation-Health-Lebanon-v3-2.pdf. Accessed 2 Mar 2019.
16. World Bank. Emergency Primary Healthcare Restoration Project. 2019. http://projects.worldbank.org/P152646?lang=en. Accessed 1 Apr 2019; 2019.
17. World Bank. Combined project information documents / integrated safeguards datasheet (PID/ISDS). 2017. Available from: http://documents.vsemirnyjbank.org/curated/ru/329781492766061970/pdf/ITM00194-P163476-04-21-2017-1492766059990.pdf. Accessed 1 Apr 2019.
18. Edwards A. Refugees in Lebanon caught in vicious debt cycle. 2015. http://www.unhcr.org/564ef96f6.html. Accessed 4 Mar 2016.
19. Ramia E, Zeenny R. Completion of therapeutic and safety monitoring tests in Lebanese outpatients on chronic medications: a cross-sectional study. Patient Prefer Adherence. 2014;8:1195–204. doi: https://doi.org/10.2147/PPA.S69250.
20. World Health Organization. Adherence to long-term therapies: evidence for action. 2003. Available from: http://apps.who.int/iris/bitstream/10665/42682/1/9241545992.pdf. Accessed 4 Dec 2015.
21. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003;42(6):1206–52. doi:https://doi.org/10.1161/01.HYP.0000107251.49515.c2.
22. Capoccia K, Odegard PS, Letassy N. Medication adherence with diabetes medication: a systematic review of the literature. Diabetes Educ. 2015;42(1):34–71. doi:https://doi.org/10.1177/0145721715619038.
23. Penning-van Beest FJ, van der Bij S, Erkens JA, Kessabi S, Groot M, Herings RM. Effect of non-persistent use of oral glucose-lowering drugs on HbA1c goal attainment. Curr Med Res Opin. 2008;24(9):2523–9. doi:https://doi.org/10.1185/03007990802336335.
24. Johnson SB. Methodological issues in diabetes research: measuring adherence. Diabetes Care. 1992;15(11):1658–67. doi:https://doi.org/10.2337/diacare.15.11.1658.
25. Baumgartner PC, Haynes RB, Hersberger KE, Arnet I. A systematic review of medication adherence thresholds dependent of clinical outcomes. Front Pharmacol. 2018;9. doi:https://doi.org/10.3389/fphar.2018.01290.
26. Ansbro E, Homan T, Jobanputra K, Rehr M, Ellithy S, Quasim J, et al. Mixed methods evaluation of MSF primary care based NCD service in Irbid, Jordon: February 2017 - February 2018. 2018. Available from: https://fieldresearch.msf.org/handle/10144/619309. Accessed 20 Feb 2019.
27. Lyles E, Doocy S. Syrian refugee and affected host population health access survey in Lebanon. 2015. Available from: http://data.unhcr.org/syrianrefugees/download.php?id=9550. Accessed 16 Sept 2016.
28. Doocy S, Lyles E, Hanquart B, Woodman M. Prevalence, care-seeking, and health service utilization for non-communicable diseases among Syrian refugees and host communities in Lebanon. Confl Health. 2016;10(21). https://doi.org/10.1186/s13031-016-0088-3.
29. Lyles E, Hanquart B, Chlela L, Woodman M, Team LHASS, Fouad FM, et al. Health service access and utilization among Syrian refugees and affected host communities in Lebanon. J Refug Stud. 2018;31(1):104–30. doi:https://doi.org/10.1093/jrs/fex014.
30. Lyles E, Hanquart B, Team LHASS, Woodman M, Doocy S. Health service utilization and access to medicines among Syrian refugee and host community children in Lebanon. J Int Humanitarian Action 2016;1(10). https://doi.org/10.1186/s41018-016-0010-z.
31. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018;71(6):1269–324. https://doi.org/10.1161/hyp.0000000000000066.
32. Rao JNK, Scott AJ. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. Ann Stat. 1984:46–60.
33. Amnesty International. Agonizing choices: Syrian refugees in need of health care in Lebanon. 2014. Available from: https://www.amnesty.org/en/documents/MDE18/001/2014/en/. Accessed 9 Jan 2016.

34. Strong J, Varady C, Chahda N, Doocy S, Burnham G. Health status and health needs of older refugees from Syria in Lebanon. Confl Health. 2015;9(12). https://doi.org/10.1186/s13031-014-0029-y.
35. UNHCR. Health access and utilization survey among non-camp refugees in Lebanon. 2014. Available from: https://data.unhcr.org/syrianrefugees/download.php?id=7111. Accessed 9 Nov 2015.
36. UNHCR. Health access and utilization survey among Syrian refugees in Lebanon. 2018. Available from: https://data2.unhcr.org/en/documents/download/67944. Accessed 1 Apr 2019.
37. UNHCR. Refugees Lebanon. https://www.refugees-lebanon.org/. Accessed 1 Apr 2019.
38. UNHCR. Ask Noor - the health chatbot. 2018. https://refugees-lebanon.org/en/news/228/ask-noor-the-health-chatbot. Accessed 1 Apr 2019.
39. UNHCR. Health access and utilization survey among Syrian refugees in Lebanon. 2017. Available from: https://data2.unhcr.org/en/documents/details/61329. Accessed 1 Apr 2019.
40. MoPH of Lebanon. EPHRP 2018 annual dashboard. 2019. Available from: https://www.moph.gov.lb/userfiles/files/Programs%26Projects/Emergency%20Primary%20Health%20Care/EPHRP%20Dashboard%20Annual%202018.pdf. Accessed 1 Apr 2019.
41. MoPH of Lebanon. EPHRP 2017 annual dashboard. 2017. Available from: https://www.moph.gov.lb/userfiles/files/Programs%26Projects/Emergency%20Primary%20Health%20Care/EPHRP%20Annual%20Dashboard%20Dec%202017.pdf. Accessed 1 Apr 2019.
42. El-Jardali F, Fadlallah R, Matar L. Primary health care systems (PRIMASYS): comprehensive case study from Lebanon. 2017. Available from: https://www.who.int/alliance-hpsr/projects/AHPSR-PRIMASYS-Lebanon-comprehensive.pdf?ua=1. Accessed 1 Apr 2019.
43. UNHCR. Inter-agency multi-sector needs assessment (MSNA) phase one report: secondary data review and analysis. 2014. Available from: https://data2.unhcr.org/en/documents/download/41234. Accessed 2 Apr 2019.