Women's health in Northwestern Syria: findings from Healthy-Syria 2017 study

Abdullah Sulieman Terkawi[1,2,3,4], Basil Bakri[5], Amena S. Alsadek[6], Rawaa H. Alsibaee[7], Esraa M. Alasfar[8], Amna H. Albakour[6], Abdulhannan Y. Aljouja[7], Nour A. Alshaikhwais[6], Feras A. Fares[7], Pamela D. Flood[9], Hussam Jnaid[7,10], Amina A. Najib[6], Diaa A. Saloom[6], Noran A. Zahra[6], Khalid A. Altirkawi[11]

[1]Syrian Expatriate Medical Association (SEMA), SEMA-US, Charlottesville, VA, USA, [2]Department of Anaesthesiology, University of Virginia, Charlottesville, VA, USA, [3]Department of Anaesthesiology, King Fahad Medical City, Riyadh, Saudi Arabia, [4]Outcomes Research Consortium, Cleveland, OH, USA, [5]Syrian Expatriate Medical Association (SEMA), SEMA-US, Cincinnati, OH, USA, [6]Syrian Expatriate Medical Association, Idlib, Syria, [7]Syrian Expatriate Medical Association (SEMA), SEMA-Turkey, Gaziantep, Turkey, [8]Charlottesville, VA, USA, [9]Department of Anaesthesiology, Stanford University, Menlo Park, CA, USA, [10]Section Head of Polyclinics, Department of Family Medicine and Polyclinics, [11]Department of Paediatrics, King Saud University, Riyadh, Saudi Arabia

ABSTRACT

Objectives: Since the uprising in 2011, there have been limited health-care data from inside Syria regarding women's health. This study aimed to provide an updated account of women's health, including pregnancy, perinatal care, childbirth, and other conditions to identify obstacles and challenges to health-care delivery in Northwestern Syria. **Methods:** This is a prospective data registry study, using a medical electronic records system that builds on the *International Classification of Diseases, Tenth Revision* (*ICD-10*) codes. We collected data from one medical center in Northwestern Syria during 2017. We conducted a survey to understand patients' knowledge of and barriers limiting antenatal care (ANC). **Results:** We studied 7213 patients' health status and surveyed 134 regarding ANC. Prenatal care, delivery, and miscarriage treatment represented the most common (70%) reasons for women's health-care visits, followed by menstrual disorders (17%). From 2057 delivery records, 70% delivered vaginally and 30% required cesarean delivery. Our findings showed that 1169 (24%) of the pregnant women (4936) in 2017 were adolescents, of them 22 (0.44%) were 14 years old. Regarding ANC visits, 85% of respondents did not have a single ANC visit in the first trimester, 82% had no visits in the second trimester, and 44% had no visits in the third trimester. Thirty-one percent had no ANC visit throughout the entire pregnancy. Only 13% had postnatal care (PNC) visits. Women who live in the refugee camp are 2.7 times less likely to meet the World Health Organization (WHO) criteria for focused ANC (FANC = 4 visits) compared to those who reside in town ($P < 0.001$), with only 14% having met the FANC. The major barrier to ANC is related to transportation (34%), followed by factors related to the study center (29%) and knowledge and education (19%). We estimated the number of obstetrics-gynecology doctors per 1000 populations to be 0.02. **Conclusions:** We found a huge deficiency in ANC and PNC visits, a high adolescent birth rate, and a higher cesarean-to-vaginal delivery ratio than what is recommended by the WHO. We also found a severe shortage in the number of obstetrician-gynecologists serving this population.

Key words: Antenatal care, cesarean delivery, delivery, refugee, Syria, women health

INTRODUCTION

In the wake of the political unrest and eruption of war in Syria, the faltering health-care system has deteriorated to the

Address for correspondence: Dr. Abdullah Sulieman Terkawi, The Syrian Expatriate Medical Association (SEMA), SEMA-US, Charlottesville, VA, USA. E-mail: asterkawi@sema-sy.org

point of near collapse, especially in the war-ravaged areas. The destruction of health-care facilities, critical shortages in supplies and personnel, and mass displacement of people have all contributed to suboptimal health-care delivery.[1-6]

These disastrous conditions stimulated many local, regional, and international agencies to extend their assistance. These efforts, though helpful, remained limited and sometimes uncoordinated.

The Syrian Expatriate Medical Association (SEMA) is a nongovernmental organization established by a group of concerned health-care professionals, who worked in the field to provide the refugees and the impoverished local population with highly needed health-care services.[7] The standard compliance practices, data collection, and reporting established in SEMA-affiliated health-care facilities (the HealthySyria[TB] program)[8] have some unique features; they are compiled directly from the field centers, and possibly, the most reliable source of information available to gauge the health-care status in this part of the world and to project its needs.

In 2017, we established the Healthy-Syria project as a comprehensive medical project that aims to highlight the health-care challenges in Syria, especially in areas inhabited by internally displaced persons (IDPs) and refugees. The project is set to guide the strategic implementation of change in the local health-care system, with planned follow-up to evaluate the impact of these changes. As part of the project, we plan to publish an annual report outlining the different trends in the local health aspects, inspired by the Global Burden of Diseases group experience and findings.[9]

Many recent reports suggested that Syrian women are currently at higher risk of poor pregnancy outcomes, including increased fetal mortality and low birth weights.[10] Nonetheless, quantitative studies to highlight the current women's health care and status are very limited. The aim of this study was to present an overview of the challenges that affect women's health, including pregnancy, perinatal care, childbirth, and other conditions, and consequently, to help identify obstacles and challenges to health-care delivery in Northwestern Syria.

METHODS

Overview

The SEMA is a not-for-profit medical organization that was established in 2011, to serve people with medical needs worldwide. In 2017, the number of medical centers affiliated with SEMA reached 40 centers in different areas

of Syria and bordering countries (e.g., Turkey and Jordan). For more information please visit the website http://www.sema-us.org/.

The HealthySyria program includes a simplified electronic medical record system developed by A.S.T. and B.B.. We started implementing the program in one of the SEMA-affiliated centers in February 2017 as a pilot program with a plan for gradual implementation in other centers that serve Syrian refugees elsewhere. The program provides each patient with a unique medical record number (MRN) for continuity and tracking. The objective of the program is to improve patients' care by providing accurate and reliable mortality records and morbidity estimations. The program provides accurate monthly reports on current health-care status to help improve the distribution process of national and international resources (financial, logistic, and man power), guide educational efforts and resources toward areas of deficiency, and provide a sound base for a future telemedicine system. More information is available in the following video: https://vimeo.com/240285087. The online version is available at www.healthysyria.net.

The primary study center is located at the Turkish border in Northwestern Syria, in Atmeh district (Idlib Governorate) [Figure 1]. This region contains multiple refugee camps and has received millions of IDPs. Before the uprising in 2011, the population was approximately 250,000 inhabitants; this number continues to increase after the forced relocation of civilians.[10] In east Idlib, by the end of 2017, it is estimated that the population that the center serves had reach 500,000 people (this is the number we used in our study). The population number increased after the displacement of civilians from Eastern Ghouta in March and April 2018 and from northern Homs in May 2018.[11] Therefore, by the end of May 2018 it is estimated that the population number served by the center reached 500,000 (in Atmeh and its nearby districts).

There are a total of five medical centers in Atmeh district: one specializing in burns, one specialized in trauma and general surgery, one specialized in trauma and orthopedic surgery, and two specialized in women's and children's health. The two women's centers locate within a similar distance from the camps and from each other (about 1 km). The entire district has 10 physicians who deliver health care for women's health, 5 of whom are based in our study center. Among these 10 physicians are 5 specialized obstetric and gynecologists, 1 family medicine doctor with a perinatal care focus, and 4 residents in training. The district also has 11 midwives who serve in both women's health centers. This study reports on data from women's and children's health center, which is the
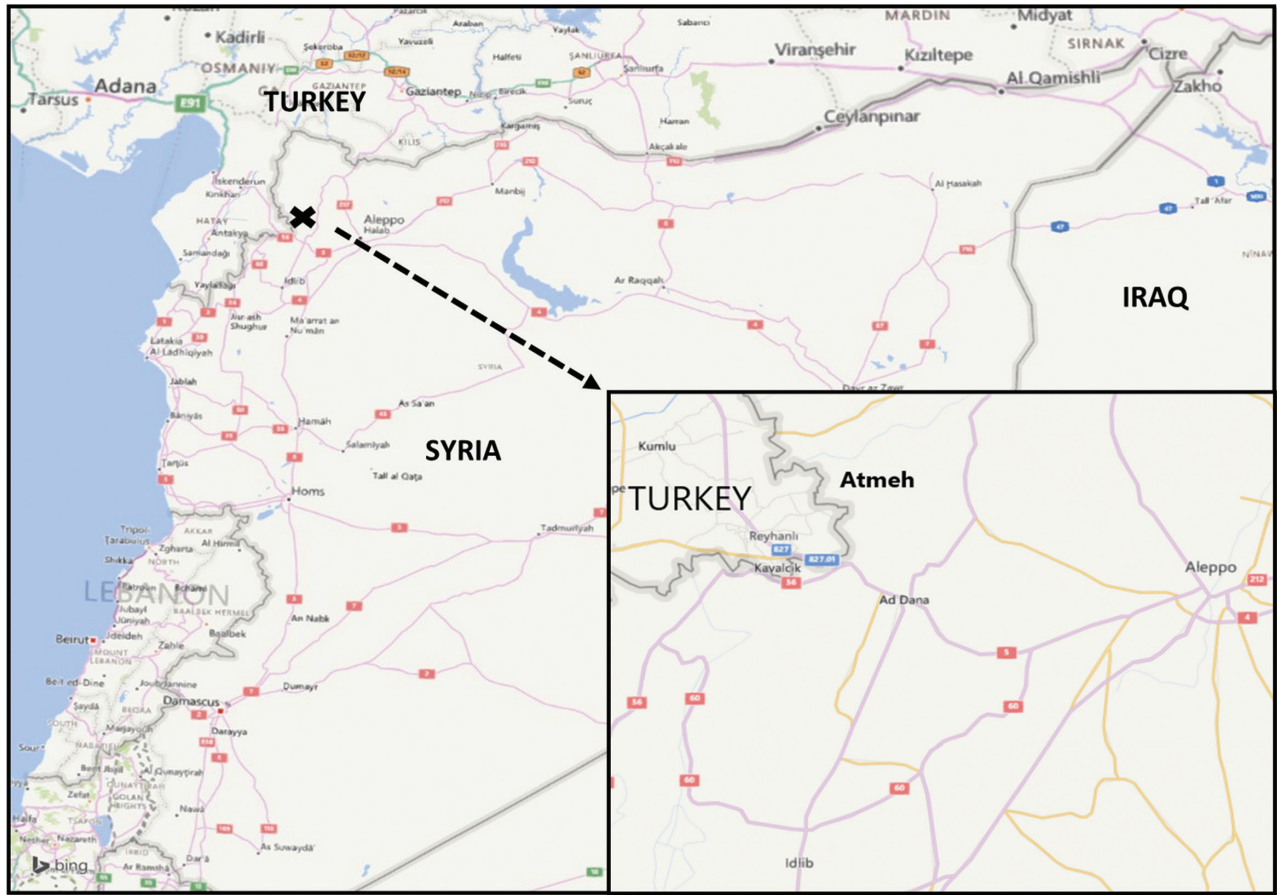
Figure 1: The study center location represented by the (x) sign in the map

largest facility. This center offers completely free services, including the medical laboratory and pharmacy. It is open Sunday to Thursday from 8:00 to 15:00, although the hospital has 24-h emergency availability. On average, the obstetrics and gynecology clinic sees 50 patients daily. After vaginal delivery, women stay 2 h for observation, whereas after cesarean delivery, they stay for 6 h, before being discharged from the hospital.

Data collection

This is a prospective data registry study during the period from February to December 2017. We conducted this study after obtaining an institutional review board (IRB) approval from the SEMA IRB committee (SEMA-IRB # 2017-04).

On arrival to the Obstetrics and Gynecology department, the nurse records the vital signs in a triage area. There is a dedicated data entry person who opens a file for each patient and enters their diagnoses and other information, using the HealthySyria program. All diagnoses are based on the *International Classification of Diseases, Tenth Revision* (*ICD-10*) coding. The data are entered daily, saved on the local server, then synchronized with the main server. The program

creates a unique MRN for each patient that consists of 12 digital letters and numbers. This MRN prevents duplication and ensures the fidelity of patients' records for future visits. At each visit, the program will open a unique encounter for the patient, and if the patient utilizes more than one department, the program will open multiple encounters. The minimum required data to open a medical record or visit include date of birth, name, national ID number, gender, condition of living, date of visit, and diagnosis. Other recommended information includes height, weight, blood group, and drug allergies.

While analyzing the data for this study, we identified very poor antenatal care (ANC) attendance; thus we developed a survey to understand pregnant women's knowledge, attitudes, and barriers toward ANC visits. After obtaining IRB approval (SEMA-IRB # 2018-01) for this substudy, we administered a cross-sectional survey. The questionnaire includes age, gestational age, living situation, and educational level. After an extensive literature review, and based on our search, we created a list of 15 potential causes that can be barriers to a pregnant woman's attendance at ANC visits, and we added these to the survey. The questionnaire was given

to the pregnant patients who were coming for their ANC visit, at the registration desk. The questionnaire was self-administered after the receptionist provided explanation, while none of the research team was involved. The only exclusion criterion for women enrollment was refusal to participate. The full version of the questionnaire is available in Supplementary Materials 1 and 2.

Data management
Incidence is presented as frequency and percentage for each disease and condition. The percentage was calculated based on the total number of patients who visited the center. Patients who visited the center and did not have a diagnosis (e.g., normal examination) were kept and used in the denominator for calculating the percentage/incidence. The condition of living is classified into two categories: patients who live in the refugee camp and those who are residents of the town—whether they own their house or living in a rental property, and whether they are originally from this area or displaced.

We compared the ANC visits with the World Health Organization (WHO) 2016 recommendations. The WHO recommends eight ANC visits as follows: one visit in the first trimester, two visits in the second trimester, and five visits in the third trimester. The WHO also developed a special program for areas with poor resources called the focused antenatal care (FANC) program, which consists of four visits as follows: one visit in the first trimester, one visit in the second trimester, and two visits in the third trimester.[12] To assess what proportion of patients met the minimal number of visits recommended by the WHO ANC and FANC, we used data from patients who delivered in October, November, and December 2017, assuming these patients had enough time from study onset to visit this center since we implemented the HealthySyria program (version 2, Ohio, USA) in February 2017.

Statistical analysis
We present descriptive statistics, using frequency, percentage, mean, standard deviation, median, and first and third interquartile range [first IQR, third IQR], as appropriate. We use a chi-square test to evaluate statistical significance when comparing categorical and frequency results. We used binary logistic regression analysis to identify the factors that are associated with low attendance rates at ANC visits. Several potential confounders were identified in *priori* and were included in the model (age, condition of living [refugee camp vs. resident in town], and parity). Models were evaluated based on their −2 Log likelihood (−2LL), Cox and Snell R-square, Nagelkerke R-square, overall predictive ability of the model, and the model-driven *P*-value by the Omnibus test. The model with the lowest −2LL, highest R-squares, and the best overall prediction accuracy was selected as the best model. A *P*-value of 0.05 was considered statistically significant. Analyses were performed and graphs were plotted using Excel 2017 (Microsoft) and SPSS, version 24 (SPSS, Chicago, IL).

RESULTS

A total of 7213 patients were included in this study. These patients had 11,284 visits. There were 5,967 encounters for follow-up, consultation, procedure (e.g., intrauterine device), surgery, or return visit (within 1 month). Excluding these, there were 7559 unique diagnoses in 7213 patients; 4148 patients (58%) lived in refugee camps. Patients' age range was 11–75 years, with a median [IQR] age of 25 (20–31) years. Figure 2 summarizes the incidence for each diagnosis category in all patients who visited the center in 2017. A comprehensive summary of the patients' diagnoses is presented in Table 1.

Antenatal and postnatal care
A total of 4936 pregnant women were seen in the center during the study period, many of whom came for multiple visits. Only 2057 (42%) women were delivered in the center during the study period; the remaining were either still pregnant or had delivered elsewhere. Among the pregnant women, 2955 (60%) were living in the refugee camp, whereas 1981 (40%) were residents in the town. The median [IQR] age for pregnant women was 24 [20–30] years.

Condition of living and ANC
Among the 730 women who delivered between October and December 2017, 283 (39%) did not have any antenatal visits. More detailed numbers are broken down in [Figure 3]. Twenty-nine (4%) women satisfied the minimal WHO requirements for ideal ANC visits (i.e., eight visits as one, two, and five visits in the first, second, and third trimesters, respectively). One hundred (14%) women satisfied the minimal WHO requirement for FANC visits (i.e., four visits as one, one, and two visits in the first, second, and third trimesters, respectively).

Regression analysis for WHO FANC
Living conditions and age are significantly associated with meeting of the minimal requirement of the WHO FANC visits. Patients living in the refugee camps are 2.7 times less likely to meet the WHO FANC visits compared to those who are town residents (see Table 2). Younger patients—adolescents (≤19 years)—were more likely to meet the WHO FANC visits. Parity is not a significant factor. All statistical tests indicate an excellent model.
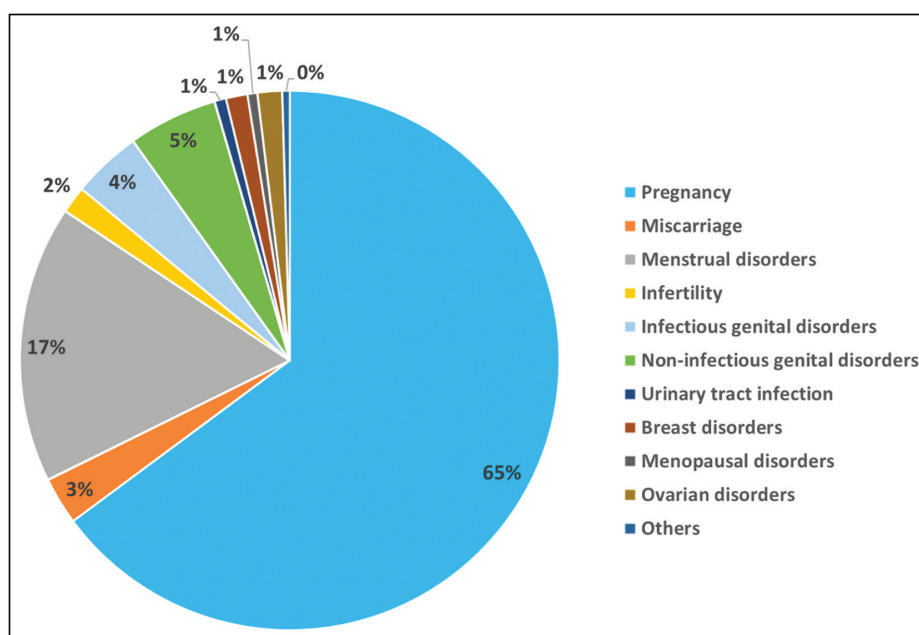
Figure 2: Overview of patients' main diagnosis for each encounter. Summary of the general categories of diseases/conditions that affect the patients who visited our center during the study period

Table 1: Comprehensive summary of the patients' diagnoses							
Diagnoses	ICD-10	Total (7213 patients)	%	Refugee camp (4148 patients)	%	Residents (3053 patients)	%
Pregnancy	NA	4936	68.43	2955	71.24	1981	64.89
Complications following (induced) termination of pregnancy	O04	1	0.01	0	0.00	1	0.03
Complications following ectopic and molar pregnancy	O08	1	0.01	1	0.02	0	0.00
Complications of the puerperium, not elsewhere classified	O90	2	0.03	0	0.00	2	0.07
Ectopic pregnancy	O00	4	0.06	3	0.07	1	0.03
Hemorrhage in early pregnancy	O20	28	0.39	9	0.22	19	0.62
Hydatidiform mole	O01	1	0.01	0	0.00	1	0.03
Other disorders of amniotic fluid and membranes	O41	1	0.01	0	0.00	1	0.03
Miscarriage		216	3.0	120	2.9	96	3.14
Miscarriage, spontaneous	O03	196	2.7	111	2.67	85	2.78
Miscarriage, threatened	O20.0	3	0.04	2	0.05	1	0.03
Complete or unspecified spontaneous miscarriage without complication	O03.9	11	0.15	5	0.12	6	0.20
Incomplete spontaneous miscarriage without complication	O03.4	6	0.08	2	0.05	4	0.13
Menstrual disorders		1265	17.54	654	15.77	611	20.01
Abnormal uterine and vaginal bleeding, unspecified	N93.9	58	0.80	32	0.77	26	0.85
Absent, scanty, and rare menstruation	N91	317	4.39	165	3.98	152	4.98
Amenorrhea, unspecified	N91.2	4	0.06	1	0.02	3	0.10
Antepartum hemorrhage, not elsewhere classified	O46	1	0.01	1	0.02	0	0.00
Dysmenorrhea, unspecified	N94.6	4	0.06	4	0.10	0	0.00
Excessive bleeding in the premenopausal period	N92.4	3	0.04	3	0.07	0	0.00
Excessive, frequent, and irregular menstruation	N92	417	5.78	220	5.30	197	6.45
Irregular menstruation, unspecified	N92.6	293	4.06	144	3.47	149	4.88
Other abnormal uterine and vaginal bleeding	N93	159	2.20	79	1.90	80	2.62
Pain and other condition associated with menstrual cycle	N94	3	0.04	1	0.02	2	0.07
Primary amenorrhea	N91.0	5	0.07	3	0.07	2	0.07
Secondary amenorrhea	N91.1	1	0.01	1	0.02	0	0.00

Table 1: Continued

Diagnoses	ICD-10	Total (7213 patients)	%	Refugee camp (4148 patients)	%	Residents (3053 patients)	%
Infertility		126	1.75	73	1.76	53	1.74
Female infertility, unspecified	N97	84	1.16	47	1.13	37	1.21
Female infertility, primary	N97	25	0.35	17	0.41	8	0.26
Female infertility, secondary	N97	17	0.24	9	0.22	8	0.26
Genital infection		317	4.39	145	3.50	172	5.63
Candidiasis of vulva and vagina	B37.3	27	0.37	10	0.24	17	0.56
Infections of genitourinary tract in pregnancy	O23	36	0.50	15	0.36	21	0.69
Inflammatory disease of cervix uteri	N72	2	0.03	1	0.02	1	0.03
Inflammatory disease of uterus, except cervix	N71	1	0.01	0	0.00	1	0.03
Other inflammation of vagina and vulva	N76	251	3.48	119	2.87	132	4.32
Noninflammatory genital disorders		407	5.64	192	4.63	215	7.04
Other noninflammatory disorders of cervix uteri	N88	4	0.06	4	0.10	0	0.00
Other noninflammatory disorders of uterus, except cervix	N85	4	0.06	4	0.10	0	0.00
Other noninflammatory disorders of vagina	N89	387	5.37	177	4.27	210	6.88
Other noninflammatory disorders of vulva and perineum	N90	7	0.10	4	0.10	3	0.10
Polyp of female genital tract	N84	3	0.04	2	0.05	1	0.03
Vulvovaginal ulceration and inflammation diseases classified elsewhere	N77	2	0.03	1	0.02	1	0.03
Urinary tract infection		53	0.73	34	0.82	19	0.62
Urinary tract infection, site not specified	N39.0	53	0.73	34	0.82	19	0.62
Breast disorders		99	1.37	44	1.06	55	1.80
Hypertrophy of breast	N62	1	0.01	0	0.00	1	0.03
Infect of breast associated with pregnancy, the puerperium, and lactation	O91	4	0.06	4	0.10	0	0.00
Inflammatory disorders of breast	N61	50	0.69	21	0.51	29	0.95
Other disorders of breast/lactation associated with pregnancy and the puerperium	O92	7	0.10	2	0.05	5	0.16
Other disorders of breast	N64	28	0.39	11	0.27	17	0.56
Unspecified lump in breast	N63	9	0.12	6	0.14	3	0.10
Menopausal disorders		45	0.62	23	0.55	22	0.72
Menopausal and other perimenopausal disorders	N95	45	0.62	23	0.55	22	0.72
Ovarian disorders		112	1.55	69	1.66	43	1.41
Other and unspecified ovarian cysts	N83.2	109	1.51	67	1.62	42	1.38
Salpingitis and oophoritis	N70	1	0.01	0	0.00	1	0.03
Noninflammatory disorders of ovary, fallopian and broad ligament	N83	2	0.03	2	0.05	0	0.00
Others		34	0.47	18	0.43	16	0.52
Abdominal and pelvic pain	R10	6	0.08	2	0.05	4	0.13
Abscess of Bartholin's gland	N75.1	1	0.01	1	0.02	0	0.00
Clitoris hypertrophy	NA	1	0.01	0	0.00	1	0.03
Delayed puberty	NA	3	0.04	3	0.07	0	0.00
Diseases of Bartholin's gland	N75	1	0.01	1	0.02	0	0.00
Dyspareunia	N94.1	6	0.08	3	0.07	3	0.10
Ecchymosis on the genital area	NA	1	0.01	0	0.00	1	0.03
Female genital prolapse	N81	6	0.08	5	0.12	1	0.03
Female pelvic inflammatory disorders classified elsewhere	N74	1	0.01	0	0.00	1	0.03
Fever of other and unknown origin	R50	2	0.03	1	0.02	1	0.03
Hormonal disturbances	NA	2	0.03	0	0.00	2	0.07
Ovulation pain	NA	1	0.01	0	0.00	1	0.03
Postcoital and contact bleeding	N93.0	2	0.03	2	0.05	0	0.00
Vaginal injury after intercourse	NA	1	0.01	0	0.00	1	0.03

Knowledge and barriers of pregnant women toward ANC

For the substudy regarding barriers to attendance at prenatal care, we interviewed 134 pregnant women. Their median [IQR] age was 24 [20–30] years. Of them, 58 (43%) live in the refugee camps and 76 (57%) are residents in town. Their median [IQR] gestational age at the interview is 19 [8.5–28.5] weeks. Their highest educational level is as follows: 16 (12%) never attended school, 26 (20%) elementary school, 36 (28%) middle school, 34 (26%) high school, 4 (3%) college, and 16 (12%) university. One hundred and three (79%) did not attend another prenatal center and 28 (21%)
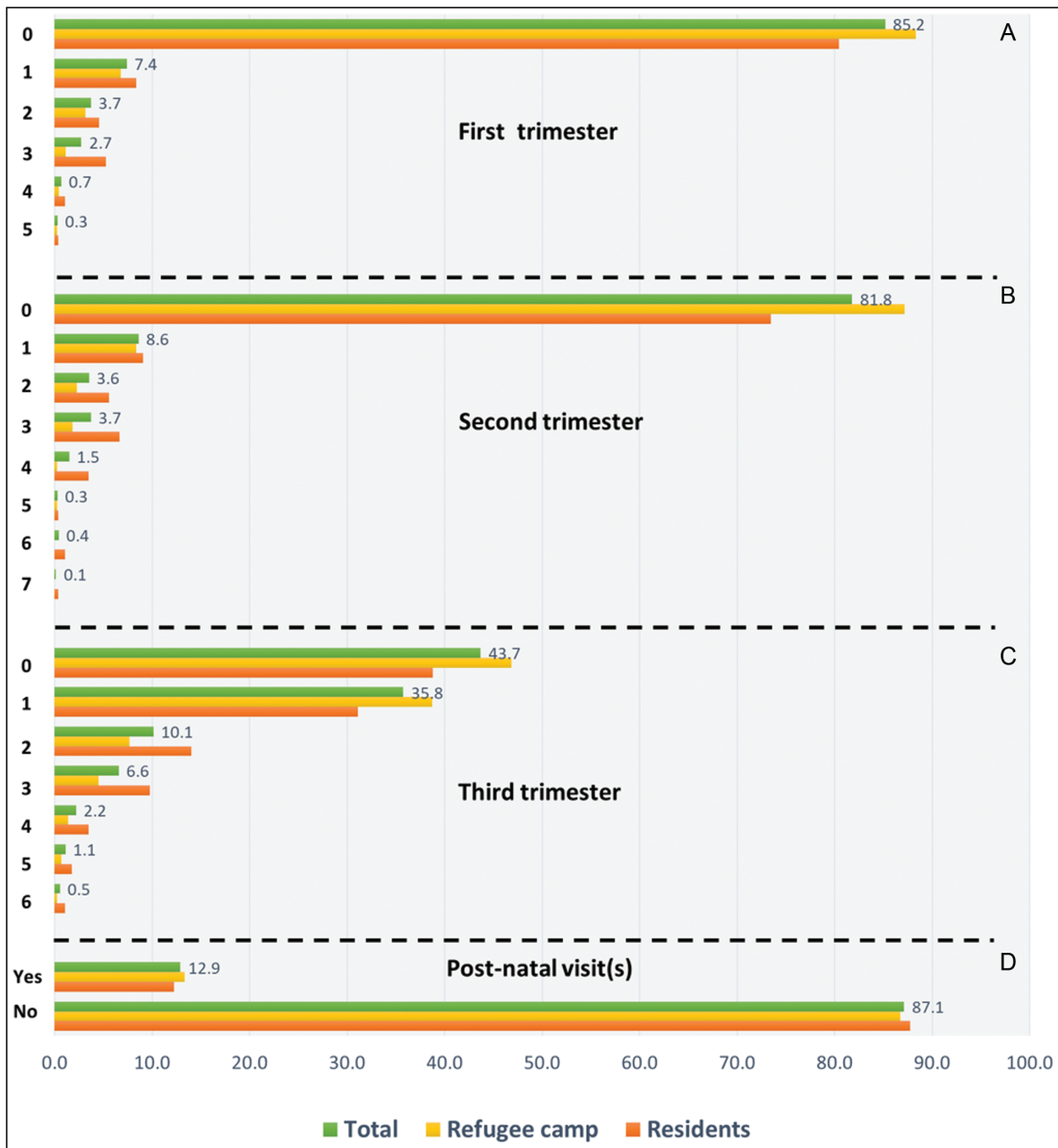
Figure 3: Percentage of patients who attended antenatal and postnatal care. Data from 730 patients who delivered on October, November, and December 2017. The figure is divided into four sections (A, B, C, and D); from the top (A), the visits in the first trimester, followed by second (B) and third (C) and at the bottom (D) the postnatal visits. The numbers on the Y-axis represent the frequency of visits during each trimester, whereas the numbers on the X-axis represent the percentage of patients who attended each visit. The green color represents all patients and the percentages beside each bar correspond with total patients. The yellow color represents patients on the refugee camp whereas the orange represents patients living in the same town (i.e., residents). Postnatal care visits are included if the patient return to the center 40 days after delivery

Table 2: Binary logistic regression model to evaluate the effect of different covenants on achieving the FANC visits

	Beta	SE	OR (95% CI)	P-value
Intercept	10.1	1.20	—	<0.0001
Condition of living	−1.0	0.26	0.37 (0.21–0.62)	<0.0001
Age	−0.6	0.06	0.55 (0.49–0.63)	<0.0001
Nulli vs. Multi	0.10	0.31	1.11 (0.60–2.0)	0.733

Model statistics: −2 Log likelihood = 371, Cox & Snell R-square = 0.23, Nagelkerke R-square = 0.48 (i.e., 48% of the variance are explained by the predictors in the model), overall model prediction = 90%, model significance (using Omnibus test) = < 0.0001. Beta = beta coefficient for the intercept (constant), CI = confidence interval; SE = standard error around the coefficient, and OR = odd ratio, with its 95% CI.

did. When we asked, "how convinced are you with the need for antenatal visits?", 58 (43%) answered very convinced, 64 (48%) answered convinced, 9 (7%) answered I do not know, 2 (2%) answered not fully convinced, and only 1 (1%) answered not convinced at all. When we asked, "do you know how many antenatal visits are needed during

pregnancy?", more than half, 70 patients (52%), did not know, whereas 64 (48%) reported that they know. When we asked, "do you know the recommended timing for antenatal care visits during pregnancy?", more than half, 68 patients (53%), do not know, whereas 61 (47%) reported that they know. When we asked, "where do you prefer to give birth?", the majority, 114 patients (86%), preferred to deliver at our center, 14 (11%) preferred to deliver at another medical center, and only 4 (3%) preferred to deliver at home, whereas none of them preferred to deliver in the camp. And finally, when we asked, "who would you prefer to get help from during childbirth?", the majority, 88 patients (67%), preferred a doctor, followed by 26 (19%) preferring a relative, 17 (13%) preferring midwife, and only 3 (2%) preferring a nurse.

The respondents selected up to 13 barriers to attending prenatal care visits, with a median of 2 barriers. The most commonly selected barrier was, "The Clinic is congested, I have to wait for a long time" 96 times (29%). We classified the barriers into four main categories shown in Figure 4:

- Factors related to transportation; overall this category was the most commonly selected 34%, with more complaints originating from respondents living in the refugee camps, as opposed to residents in town (41% vs. 26%, $P = 0.04$)
- Factors related to the center represented 29%, which seems to be less an issue in respondents living in the refugee camps than residents in town (26% vs. 33%, $P = 0.43$)

- Factors related to education represented 19%. Eighteen percent from the refugee camp respondents selected this vs. 22% from respondents who reside in town ($P = 0.65$)
- Other factors represented 18%. Sixteen percent from the refugee camp respondents selected this vs. 20% from respondents who reside in town ($P = 0.63$).

Delivery method

We collected 2057 delivery records; 70% delivered vaginally and 30% required cesarean delivery. Table 3 summarizes the basic demographic and clinical characteristics of the cohort.

Cesarean delivery

Two (0.3%) patients who delivered by cesarean required hysterectomy to control bleeding. Only 10 (2%) cesarean deliveries were for twin pregnancy whereas the remaining were for a singleton fetus. The median [IQR] of duration of surgery was 30 [30–37] min. The median [IQR] estimated blood loss is 500 [500–500] mL. The majority are conducted under spinal anesthesia 98% (590 patients) with only 2% (10 patients) under general anesthesia. All patients received both ceftriaxone and metronidazole for infection prophylaxis. Patients were discharged home after surgery after regaining lower extremity movement, hemodynamic stability, and pain control. The median [IQR] duration of hospital stays after delivery was 7 [6–7] h. Table 4 summarizes the indications for cesarean delivery. For the parturients who had previous cesarean delivery as an indication for cesarean delivery, the median [IQR] parity is 2 [0–3]; 191 (66%) of these parturients had two previous deliveries. Considering all parturients who had cesarean delivery, 263 (44%) of these
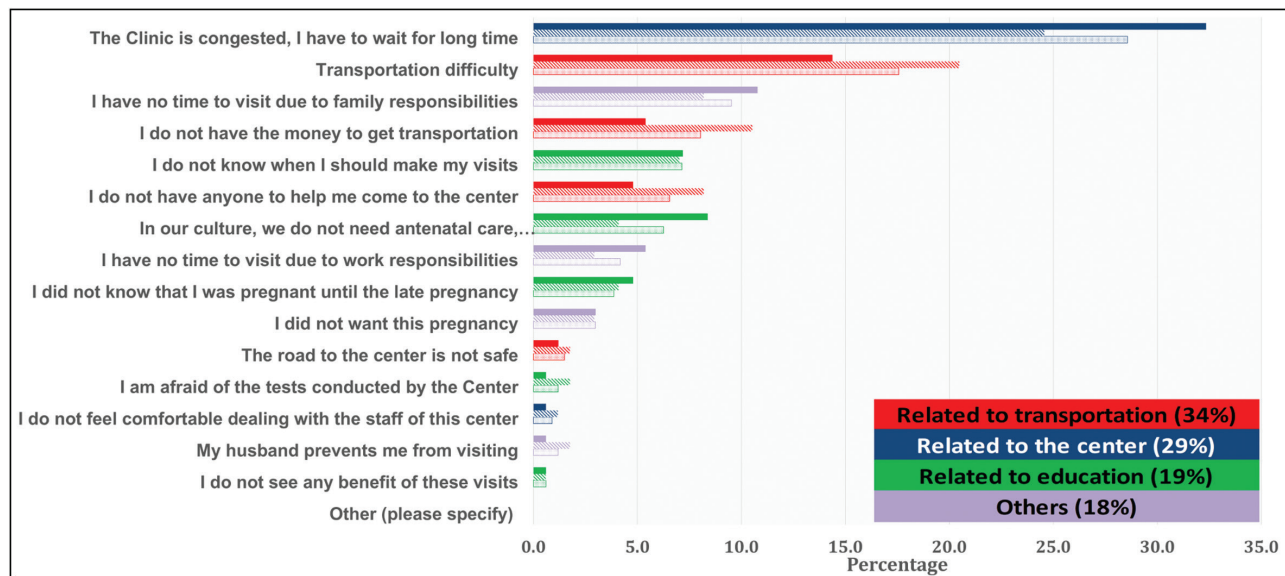

Figure 4: Patients' selected barriers for ANC visits. The numbers represent percentage indicated. The patient can choose more than one reason. Color-coded box is presented at the right lower corner. The solid color represents all patients, bars with oblique lines represent patients living in the refugee camp, and bars with light dots represent patients' resident on town

Table 3: Demographic and clinical characteristics of deliveries			
	Cesarean delivery	Vaginal delivery	All deliveries
Frequency (%)	600 (30)	1457 (70)	2057
Age (years)			
Mean (SD)	25.6 (6)	24.4 (6)	24.8 (6)
Median [Min–Max]	24 [16–45]	23 [15–44]	24 [15–45]
Gravida			
Mean (SD)	3.0 (2)	3.2 (2)	3.2 (2)
Median [Min–Max]	2 [1–15]	3 [1–18]	3 [1–18]
Para			
Mean (SD)	1.7 (2)	2.0 (2)	1.9 (2)
Median [Min–Max]	1 [0–10]	2 [0–11]	1 [0–11]
Gestational age (wk)			
Mean (SD)	38.1 (1)	38.4 (1)	38.3 (1)
Median [Min–Max]	38 [32–42]	38 [31–42]	38 [31–42]
Term (%)	487 (81)	1193 (82)	1680 (82)
Preterm (<37 wk) (%)	32 (5)	50 (3)	82 (4)
(>40 wk) (%)	21 (3)	93 (6)	114 (5)
Missing (%)	60 (10)	121 (8.3)	181 (8.8)
Condition of living			
Residents (%)	245 (41)	547 (37)	792 (38)
Refugee camp (%)	355 (59)	910 (62)	1265 (61)

Table 4: Indications for cesarean delivery		
Indications for cesarean delivery	Frequency	Percentage
Previous cesarean delivery	288	48.57
Prolonged labor or a failure to progress (dystocia)	97	16.36
Fetal distress	86	14.50
Abnormal presentation (breech or transverse positions)	42	7.08
Failed labor induction	30	5.06
Placental problems (placenta previa, placental abruption, or placenta accreta)	23	3.88
Lack of safe place for vaginal labor	7	1.18
Preeclampsia or eclampsia	4	0.67
Bicornuate uterus	2	0.34
Cord prolapse	1	0.17
Small pelvis	1	0.17
Umbilical cord abnormalities	1	0.17
Postdate	1	0.17

had two previous deliveries [Table 3]. No data are available about mortality rate.

Miscarriage

We recorded 216 (3% of all patient population) cases of miscarriage; 120 (56%) were in women living in refugee camps and 96 (44%) in patients who were resident in town. Their median [Min–Max] age was 26 [14–47] years. Their median [Min–Max] gravida was 3 [1–15]. Their median [Min–Max] para was to 2 [0–9]. Their median [Min–Max] number of previous miscarriages was 0 [0–10]. Their median [Min–Max] gestational age at the delivery was 10 [6–24] weeks. All gynecology history numbers were self-reported.

DISCUSSION

Syria has an ongoing violence against civilians since 2011. The destruction of health-care facilities, critical shortages in supplies and personnel, and mass displacement of people all contributed to suboptimal health-care delivery, or in many cases failure.[4] War-related death has become the leading cause of mortality in all segments of the population, especially in women and children.[5] In 2015, the United Nations Population Fund (UNFPA) estimated that, without adequate international funding, 70,000 pregnant Syrian women faced the risk of giving birth in unsafe conditions if access to maternal health services was not improved. A 2016 UNFPA report estimated that 360,000 Syrian IDPs are pregnant, yet many do not receive any ANC or postnatal care (PNC). Recent reports suggested that, as a result of the ongoing war, Syrian women have higher rates of poor

pregnancy outcomes, including increased fetal mortality and low birth weights.[10]

In early 2018, it was estimated that more than 5.6 million Syrians fled the country as refugees, and 6.1 million were displaced within Syria.[13] In this study, we present, to the best of our knowledge, the first quantitative description of women's health status in northwestern Syria since the uprising in 2011. This is an area heavily crowded with displaced civilians from many regions in Syria, who fled their homes secondary to the ongoing violence. Many of our findings may be similar to other areas in Syria that are similarly affected. It is difficult, with current data, to make accurate estimations for disease and condition incidence and prevalence, mainly because of inaccessibility of other medical centers in this area and highly mobile population. Furthermore, it is impossible to have an accurate population count with the ongoing movement of displaced people to this area. Nonetheless, our findings represent a base for future studies and highlight a few important and urgent problems that may hopefully guide assistance.

Prenatal care, delivery, and miscarriage management represents the most common (about 70%) reasons for women's health-care visits. This represents the highest demand for obstetric services. Having an appropriate number of ANC visits is of paramount importance as appropriate ANC has been shown to reduce maternal and perinatal morbidity and mortality both directly, through detection and treatment of pregnancy-related complications, and indirectly, through the identification of women at increased risk of developing complications during labor and delivery.[12] Indeed, ANC is one of the 16 tracer indicators for the sustainable development goals (SDGs) by the WHO, for maternal mortality. Globally, the trend for medical coverage

for ANC (four minimal visits) increased from about 50% in 2000 to more than 60% in 2015.[14] In November 2016, the WHO issued a new series of recommendations to improve quality of ANC to reduce the risk of stillbirths and pregnancy complications and give women a positive pregnancy experience. The recommendation states, "By focusing on a positive pregnancy experience, these new guidelines seek to ensure not only a healthy pregnancy for mother and baby, but also an effective transition to positive labor and childbirth and ultimately to a positive experience of motherhood."[12] Eight or more contacts for ANC can reduce perinatal deaths by up to 8 per 1000 births when compared to four visits.[12] However, the WHO designed an FANC program, which consists of four visits, mainly for areas with poor resources (e.g., low-income developing countries in Africa). Of note, according to the UNICEF reports, in 2009 the percentage of women aged 15–49 years attended at least four times during pregnancy by any provider, in Syria, was 64% nationally, 68% in urban areas, and 59% in rural areas.[15] Our results showed that only 4% achieved eight visits, and only 14% achieved four visits. This huge decline from the global trend (14% vs. 64%) may have a drastic negative impact on the maternal mortality ratio. This is something that we were not able to address in this study but hope to measure in the future with our functional infrastructure.

We found a strikingly low attendance and compliance with ANC visits, with 85% of parturients sampled not having a single ANC visit in the first trimester, 82% with no visits in the second trimester, and 44% with no visits in the third trimester. Nearly 40% of mothers did not have a single ANC visit throughout the whole pregnancy. This picture is far away worse than that found in many poor developing countries, including Kenya,[16] Nepal,[17] and Rwanda,[18] that historically had significantly higher maternal mortality rates than Syria. We investigated the reasons underlying this change that occurred since the 2011 war to facilitate attempts to overcome obstacles to appropriate ANC. Our survey evaluated major barriers that were divided into four categories: transportation to the center (34%), work flow in the center (29%), knowledge and education (19%), and others (18%). More than half of participant pregnant women do not know how many times and when they should come for ANC. It is promising, however, that the majority (92%) of the women are convinced that ANC is important. Indeed, the majority (86%) preferred to deliver at our center with the assistance of a doctor (66%). Inability seems to be mainly related to transportation issues (e.g., lack of transportation, lack of money to get transportation, and road safety).

Adolescent birth rates, in addition to ANC compliance, are another WHO SDGs' indicator. Globally, the adolescent birth rate in 2015 was 44.1 per 1000 adolescent girls aged 15–19 years.[14] In 2009, the WHO estimated the adolescent birth rate in Syria to be 54 per 1000 adolescent girls. According to the UNICEF reports, in 2009 the percentage of women aged 20–24 who gave birth before age 18, in Syria, was 9% nationally, 10% in urban areas, and 7% in rural areas.[15] Our findings showed that 1169 (24%) from the total delivered women (4936) in 2017 were adolescent, with 22 (0.4%) 14 years old. We were not able to accurately estimate the adolescent birth rate, as we cannot determine the denominator number and accurately count all the cases. But it seems that our numbers indicate that we have a higher rate than the global, or previously estimated trends before the war erupted. Local reports indicated that the increased rate of adolescent marriage in these areas is mainly because of the financial collapse. Most families are not able to provide for their adolescent girls, send them to school, or to help them find a job. The risk of death associated with pregnancy in adolescents is about a third higher than that of the next older age group (20- to 24-year-old).[19] Furthermore, it seems that adolescents are also more likely to experience more complications such as obstructed labor, fistulas and premature delivery, and to give birth to low birth weight babies than older women.[19]

The international health-care community has considered the ideal rate for Caesarean sections to be between 10% and 15%.[20] The 2015 WHO statement on cesarean delivery rate recommended that every effort should be made to provide cesarean delivery to women in need, rather than striving to achieve a specific rate. Our center has in-house on-call physicians all the time to deal with any emergency cesarean delivery. However, cesarean deliveries are associated with short- and long-term risks, which can manifest years beyond the current delivery, affecting both the mother and the baby. This is especially true in areas with limited access to comprehensive obstetric care where prolonged labor may precede cesarean delivery, increasing the complication rate.[14] In our population, we reported a cesarean delivery ratio of 30%. This ratio is higher than WHO ideal ratio, and higher than the ratio before the war. According to the UNICEF reports, in 2009 the percentage of births delivered by cesarean delivery, in Syria, was 26% nationally, 29% in urban areas, and 23% in rural areas.[15] Among the reasons for cesarean deliveries that we reported, the lack of a safe place for vaginal labor (1.2%) seems to be the most avoidable reason. These patients typically asked for elective cesarean delivery to avoid having a natural vaginal birth in unsafe place at unpredictable time. Of note, this reason is reported more often in areas that are under siege and bombarding, as parturients tend to come to the centers during time of no bombarding to deliver, instead of waiting for the

natural labor to happen. The other potentially modifiable indication for cesarean delivery is history of a previous cesarean delivery. However, 66% of this category had more than two deliveries, which make cesarean delivery almost an unavoidable indication.[21] Furthermore, our center is not fully equipped to deal with vaginal birth after a previous caesarean. Among all cesarean delivery patients, 44% had more than two deliveries before, which puts these patients at a higher risk for complications. Interestingly, we found higher rate of cesarean delivery in women living in refugee camps vs. those in town (59% vs. 41%). It is not clear why; however, this finding can be related to lower rate of ANC in refugee camps, which may lead to less planned delivery. More research is required in this area.

Although the barriers noted on the questionnaire were specific to ANC visits, they can be extrapolated for other diseases and conditions. For example, despite being higher in numbers, patients who live in the refugee camp tend to visit the center less commonly. This seems to be mainly related to transportation issues (e.g., lack of transportation, lack of money to get transportation, and road safety). Therefore, our findings regarding the incidence of genital infections and disorders, infertility, and menopausal disorders, especially in women in the refugee camps, are likely an underestimation. This population tends to come to the center only for urgent conditions and pregnancy. It is also surprising that we did not report any cancers. The lack of early cancer detection screening programs and the

lack of more specialized centers and physicians complicate this picture further.

Figure 5 shows a selected picture from the refugee camp where people lived in poorly made tents, during winter 2017. The purpose of this picture is to demonstrate the poor sanitation and challenges for transportation.

From the beginning of 2014 until March 2018, the WHO reported 678 attacks on health-care personnel and facilities.[22] Our reporting office in SEMA, in collaboration with other health-care organizations, has provided the following statistics: in 2017 alone, we reported 382 direct attacks on health-care facilities, in Northwest and Eastern Ghota. Because of these attacks, 39 centers were completely out of service. We also reported 61 medical personnel who were killed and 239 injured in 2017 by the attacks. In addition, the ongoing war had its indirect negative impact on health care. Many physicians and other high-level providers fled the country and left these areas with an extreme shortage of professional medical providers. For example, in the Idlib governorate, there are only 36 (including residents in training) obstetrics and gynecology physicians, who serve a population estimated at 3 million. Only 10 (including residents in training) serve the Atmeh area, in which 500,000 people are currently estimated to live in Atmeh and its nearby districts. Thus, the estimated number of obstetrics-gynecology doctors per 1000 total population is 0.02 in Atmeh (where we have our study center), and 0.012 in the

Figure 5: Selected photo from the refugee camp from which our patients came (during winter 2017)

Idlib governorate. These numbers are drastically below any recommended standards or similar low-income counties. For example, the number of obstetricians per 1000 population in the United States, United Kingdom, and France equals 2.4, 2.5, and 3.4, respectively.[23] While by looking at similar low-income countries, we found that the estimated number of obstetrics and gynecology physicians per 1000 population was 0.081 and 0.015 in urban and rural Yemen, in 2012, respectively.[24,25] Of note, the most recent WHO estimation of all physicians per 1000 in 2014 was 1.546 in whole Syria; however, data about the density of obstetrics-gynecology doctors seem not available.[26] This severe shortage forced many centers to have residents who fled their cities and have little training as the only practitioner to take care of complicated patients. Furthermore, we reported general surgeons doing cesarean deliveries in some areas. Added to all the previously mentioned issues, the reduced availability of medical supplies and medications is affected by the siege.

Limitations

This study data are derived from a single center in the Northwestern part of Syria. Thus, it may not perfectly represent other affected areas in Syria nor the across-the-border communities in neighboring countries. The recent deployment of HealthySyria program made accessible data limited to 2017 only, making extrapolation to a longer period difficult. Twenty-one percent of women surveyed reported visiting another center and as such, our estimations may be slightly low. Nonetheless, this will not change our conclusion that compliance with ANC is extremely poor, and urgent interventions are required. Although the barriers noted on the questionnaire were specific to ANC challenges, they may be extrapolated to other diseases and conditions. For example, patients who live in the refugee camps tend to visit the center less commonly, despite representing a higher proportion of the population. Unsafe transportation may in part explain this issue.

Future directions

We are expecting to complete the implementation of HealthySyria program in all SEMA-affiliated centers in Syria in the upcoming year. We have invited other organizations to consider the use of our infrastructure in their affiliated centers. This will increase the reliability and the scope of our data as we plan for reiteration of this study. For the next years of the Healthy-Syria studies, we expect to get more accurate estimation of maternal mortality, pregnancy outcomes, adolescent birth rate, infectious diseases, infertility, contraception, menopausal disorders, and oncology cases.

Recommendations

We recommend the following:

- Increasing the number of medical staff, mostly obstetricians and gynecologists, by training position-suitable candidates in other countries, and eventually, through establishing a robust residency training program for medical graduates from this locality.
- Work to make free transportation available for these patients, e.g., by assigning buses for the center.
- Implement the WHO FANC program, which will require more staffing, education, and organization of the patients' visits.
- Opening a cancer screening and menopausal disorders clinic for older women in the population. Early detection of cancer should be a priority and screening tools should be available.
- Implication and development of the HealthySyria program in more centers to create a wider national database tracking a broader segment of patients. This will allow for better estimates of the incidence and prevalence of different diseases, mortality, and morbidity to guide intervention.

CONCLUSIONS

In this study, we provide clean, standardized data that were collected prospectively using a medical electronic record system designed specifically to accommodate the needs in the Syrian field centers. Our study highlights many important findings and should guide better health care in the future. We found a huge deficiency in the ANC and PNC visits, high adolescent birth rate, and higher cesarean delivery ratio than recommended by the WHO. We also found a severe shortage in the number of obstetrician-gynecologists per 1000 population. We observed underreported infertility and menopausal disorders with no oncology cases. Although our entire population is struggling, patients who live in the refugee camps seem to have more difficulties to attend medical care. The major challenges facing patients trying to visit the center, especially for their ANC visits, are related to poor transportation services and deficient staffing. The recommendations we made based on these findings require more generous funding and better organized international support directed to these issues.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Attar S. The hell of Syria's field hospitals. N Engl J Med 2016;374: 2205-7.

2. Guha-Sapir D, Rodriguez-Llanes JM, Hicks MH, Donneau AF, Coutts A, Lillywhite L, *et al*. Civilian deaths from weapons used in the Syrian conflict. BMJ 2015;351:h4736.

3. Alahdab F, Omar MH, Alsakka S, Al-Moujahed A, Atassi B. Syrians' alternative to a health care system: "field hospitals". Avicenna J Med 2014;4:51-2.

4. Cousins S. Syrian crisis: health experts say more can be done. Lancet 2015;385:931-4.

5. Guha-Sapir D, Schlüter B, Rodriguez-Llanes JM, Lillywhite L, Hicks MH. Patterns of civilian and child deaths due to war-related violence in Syria: A comparative analysis from the violation documentation center dataset, 2011–16. Lancet Glob Health 2018;6:e103-10.

6. Elamein M, Bower H, Valderrama C, Zedan D, Rihawi H, Almilaji K, *et al*. Attacks against health care in Syria, 2015-16: Results from a real-time reporting tool. Lancet 2017;390:2278-86.

7. Syrian Expatriate Medical Association (SEMA). 2018. Available from: http://www.sema-sy.org/. [Last accessed on 2018 Jun 9].

8. Terkawi AS, Bakri B. HealthySyria™. 2016. Available from: www.healthysyria.net. [Last accessed 2018 Jun 9]

9. Institute for Health Metrics and Evaluation (IHME). Global burden of disease (GBD). 2018. Available from: http://www.healthdata.org/gbd. [Last accessed on 2018 Jun 9].

10. Aburas R, Najeeb A, Baageel L, Mackey TK. The Syrian conflict: A case study of the challenges and acute need for medical humanitarian operations for women and children internally displaced persons. BMC Med 2018;16:65.

11. Councel UNHR. UN Commission of Inquiry on Syria: The siege and recapture of eastern Ghouta marked by war crimes, crimes against humanity. Available from: https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=23226&LangID=E. [Last accessed on 2018 Jun 24].

12. World Health Organization. WHO Recommendation on Antenatal Care for Positive Pregnancy Experience. Geneva, Switzerland: World Health Organization; 2016. p. 152.

13. World Vision. Syrian refugee crisis: Facts, FAQs, and how to help. 2018. Available from: https://www.worldvision.org/refugees-news-stories/syrian-refugee-crisis-facts. [Last accessed 2018 Jun 9].

14. World Health Organization. World Health Statistics 2017: Monitoring Health for the SDGs. Geneva, Switzerland: World Health Organization; 2017.

15. UNICEF. UNICEF data: Monitoring the situation of children and women. 2018. Available from: https://data.unicef.org/topic/maternal-health/antenatal-care/. [Last accessed 2018 Jun 17].

16. van Eijk AM, Bles HM, Odhiambo F, Ayisi JG, Blokland IE, Rosen DH, *et al*. Use of antenatal services and delivery care among women in rural western Kenya: A community based survey. Reprod Health 2006;3:2.

17. Deo KK, Paudel YR, Khatri RB, Bhaskar RK, Paudel R, Mehata S, *et al*. Barriers to utilization of antenatal care services in eastern Nepal. Front Public Health 2015;3:197.

18. Hagey J, Rulisa S, Pérez-Escamilla R. Barriers and solutions for timely initiation of antenatal care in Kigali, Rwanda: Health facility professionals' perspective. Midwifery 2014;30:96-102.

19. Sedgh G, Finer LB, Bankole A, Eilers MA, Singh S. Adolescent pregnancy, birth, and abortion rates across countries: Levels and recent trends. J Adolesc Health 2015;56:223-30.

20. World Health Organization Human Reproduction Programme 10 April 2015. WHO Statement on caesarean section rates. Reprod Health Matters 2015;23:149-50.

21. Mylonas I, Friese K. Indications for and risks of elective cesarean section. Dtsch Arztebl Int 2015;112:489-95.

22. World Health Organization. Syrian Arab Republic—Number of attacks on health care and health facility functionality. 2018. Available from: http://www.who.int/emergencies/crises/syr/syr-attack-health.gif?ua=1. [Last accessed 2018 Jun 9].

23. Eguchi N. Do we have enough obstetricians? - A survey by the Japan Medical Association in 15 countries. Japan Med Assoc J 2009;52:150-7.

24. Al Serouri AW, Al Rukeimi A, Bin Afif M, Al Zoberi A, Al Raeby J, Briggs C, *et al*. Findings from a needs assessment of public sector emergency obstetric and neonatal care in four governorates in Yemen: A human resources crisis. Reprod Health Matters 2012;20:122-8.

25. Hoyler M, Finlayson SR, McClain CD, Meara JG, Hagander L. Shortage of doctors, shortage of data: A review of the global surgery, obstetrics, and anesthesia workforce literature. World J Surg 2014;38:269-80.

26. WHO. Global Health Observatory data repository. 2014. Available from: http://apps.who.int/gho/data/node.main.A1444. [Last accessed 2018 Jun 9]