Strengthening Family Planning
تعزيز تنظيم الأسرة
Project

The Impact of Evidence-Based Medicine on Family Planning Providers' Knowledge, Attitudes, and Practices: A Randomized Experiment in Jordan

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EXECUTIVE SUMMARY

The modern contraceptive prevalence rate in Jordan has remained unchanged over the past 10 years with approximately 42 percent of married women of reproductive age using a modern family planning method and 19 percent using a traditional method [Department of Statistics (Jordan) and ICF International, 2013]. Evidence also suggests that there is unmet need for modern methods. About 26 percent of women said that over the previous five years, they had had a childbirth that was either unwanted or mistimed [Department of Statistics (Jordan) and ICF Macro, 2010]. The modern method mix in Jordan is concentrated on just a few methods, including intrauterine devices, and to a lesser extent, oral contraceptive pills and condoms. In fact, many Jordanian women are reluctant to use modern methods due to fears of side effects and other health concerns. At the same time, Jordanian providers have biases against family planning methods, particularly hormonal methods.

More than half of modern method users in Jordan obtain their method from a private sector source. The USAID-funded "Strengthening Family Planning" project (*Ta'ziz Tanzim Al Usra*, or Ta'ziz) in Jordan aims to expand the availability, quality, and use of family planning services through partnership with the private sector. The project implements a variety of interventions to influence consumer behavior and address barriers among providers, including broadening the method mix available to Jordanian women.

Since 2010, the project has been implementing an "Evidence-Based Medicine" (EBM) program to address deep-seated provider biases against family planning methods. The EBM approach gives health care providers access to the best research evidence on clinical topics and encourages them to integrate it with their clinical experience and patient preferences to make health care decisions and recommendations. In 2012, the Ta'ziz project conducted an EBM intervention over the course of six months specifically aimed at addressing biases related to the three-month contraceptive injection, depot medroxyprogesterone acetate (DMPA). DMPA has had a low acceptance rate among both providers and consumers due to concerns about its side effects. The EBM intervention consisted of roundtable seminars that disseminated scientific evidence about DMPA and detailing visits that reinforced the seminars' messages.

This study uses an experimental design approach to evaluate the impact of the EBM DMPA intervention in Jordan on providers' knowledge, attitudes, and reported practices. Two hundred and sixty seven private health providers were randomly assigned to treatment and control groups. The treatment group doctors were selected to participate in the intervention. A baseline and a follow-up survey collected information on providers' knowledge, attitudes, and reported practices related to DMPA.

The study team constructed outcome measures to assess (1) providers' knowledge of DMPA (e.g., correct identification of side effects, risks, and benefits), (2) their attitudes towards DMPA (e.g., willingness to recommend DMPA), (3) their self-perceived confidence level (e.g., confidence in discussing DMPA with clients), and (4) their reported clinical behavior or practice (e.g., reported prescription or discussion of DMPA with clients). The team estimated the impact of the EBM intervention using a number of regressions that measured the differences in outcomes between providers assigned to the treatment group and providers assigned to the control group.

Overall, the study failed to detect a positive and significant impact of the EBM intervention on providers' overall knowledge of the contraceptive's side effects and on reported clinical

practices. There is some suggestive evidence of a positive impact on providers' attitudes and self-reported level of comfort in prescribing DMPA to clients. A few possible factors may help explain these findings.

First, a low rate of attendance at the roundtable seminars meant that less than half of providers assigned to the treatment group actually received the complete EBM intervention. The high rate of no-shows have likely dampened the true impact of the intervention and thus reduced the ability to detect effects on provider knowledge and in turn, on attitudes and practices.

Second, the intensity of the intervention may be too weak. One two-hour long roundtable seminar and two shorter detailing visits over the course of a six-month period may not have been long or aggressive enough. Without regular follow-up throughout these six months, some of the knowledge acquired during the DMPA seminars and detailing visits could have been lost.

Third, given the very low level of demand for injectable methods in Jordan, providers may be resistant to changing their own attitudes and clinical practices, especially when EBM encourages providers to account for their patients' preferences. Given concerns about DMPA's side effects among Jordanian women, providers may continue to favor other methods despite the research evidence and knowledge acquired during the EBM intervention.

Since seminar attendance was low, the study team further explored the data to understand better the differences between the providers who complied with the intervention and those who did not. The study finds evidence of self-selection into the roundtable seminar: providers who attended the seminar were more likely to have higher knowledge of DMPA at baseline.

EBM may provide a useful approach to changing provider knowledge, attitudes, and practices and may be a valuable investment in improving the delivery of reproductive health services. While this study found little evidence of impact, this particular EBM intervention was focused on an unpopular hormonal method in a specific context. A number of lessons learned are worth considering: In the absence of national requirements for continuing medical education, EBM program implementers may consider a mix of incentives to encourage attendance further among busy health care providers. It is also important to improve the monitoring of each EBM intervention in order to address low participation rates early on. Furthermore, a more intensive intervention may be required in order to show large shifts in knowledge and attitudes and allow these corrections for biases towards DMPA to lead to changes in clinical practices. Finally, EBM alone may not be enough, especially when providers are encouraged to consider patient values and preferences in their clinical decision-making. Given the low popularity of these methods, EBM may be best coupled with complementary interventions specifically targeted at reducing biases and misconceptions among consumers.

I. Introduction

A. Context: Family planning in Jordan

With an average population growth rate of 2.2 percent per annum in 2012 (World Bank), Jordan has one of the fastest growing populations in the world. According to the 2012 Jordan Population and Family Health Survey (JPFHS), about 42 percent of married women of reproductive age (MWRA) use a modern family planning method – a rate that has essentially been flat over the past 10 years, while 19 percent use a traditional method such as withdrawal or periodic abstinence [Department of Statistics (Jordan) and ICF International, 2013]. At the same time, there is unmet need for modern methods in Jordan. In the 2009 JPFHS, 11 percent of MWRA said they wanted either to have no more children or to space their next birth, but they were not using any method of family planning [Department of Statistics (Jordan) and ICF Macro, 2010]. Moreover, 26 percent said that over the previous five years, they had had a childbirth that was either unwanted or mistimed.

The method mix in Jordan is concentrated on just a few methods. Approximately 51 percent of modern method users use intrauterine devices (IUD), while 19 percent use oral contraceptive pills, and 18 percent use condoms [Department of Statistics (Jordan) and ICF International, 2013]. Injectable contraceptives and implants are among the least popular methods: only 2 percent of modern users in Jordan use injectable contraceptives and less than 1 percent use implants.

Many Jordanian women are reluctant to use modern methods, especially hormonal methods, due to fears of side effects and other health concerns (Health Policy Initiative 2010). Many discontinue the use of hormonal methods for these same reasons. The discontinuation rate is highest for injectable contraceptives (50 percent), followed by the pill (46 percent) [Department of Statistics (Jordan) and ICF International, 2013].

Jordanian providers also have strong biases and misconceptions about modern family planning methods. These barriers include a continued provider bias towards "checking for fertility" and ensuring newly married women are able to conceive before prescribing modern methods (Bitar and Shahrouri 2008; Bagaeen et al. 2000; Abdelnour 2002; Halassa 2008), as well as provider misconceptions related to side effects that are most pronounced for hormonal methods (Bitar and Shahrouri 2008), including oral contraceptive pills, implants, and injectable methods.

B. Addressing provider bias through Evidence-Based Medicine

The private sector is an important source for family planning in Jordan. More than half of modern method users in Jordan obtain their method from a private sector source: 35 percent from the for-profit sector and 21 percent from non-governmental organizations [Department of Statistics (Jordan) and ICF International, 2013]. Given the importance of the private sector, the USAID-funded "Strengthening Family Planning" project (*Ta'ziz Tanzim Al Usra*, or Ta'ziz) in Jordan aims to expand the availability, quality, and use of family planning services and methods through partnership with both the for-profit and the non-governmental health sector in Jordan. The project implements a variety of interventions to influence consumer behavior and address barriers among providers, including broadening the method mix available to Jordanian women.

Since 2010, the Ta'ziz project has been implementing an "Evidence-Based Medicine" (EBM) program to address deep-seated provider biases against family planning methods and to provide the medical community evidence-based information related to side effects and perceived harm to health among clients. The EBM approach gives health care providers access to the best research evidence on clinical topics and encourages them to integrate it with their clinical experience and patient values to make decisions and recommendations about the care of individual patients. First defined as EBM in 1992, the practice is now widely accepted among health care professionals, particularly in developed countries, and across a wide range of health disciplines (Strauss, 2004; Chinnock et al. 2005).

EBM interventions seek to reduce misconceptions and improve knowledge of methods among health care providers by providing credible information based on scientific facts with solid documented evidence. With improved knowledge, negative attitudes among providers are likely to decrease. As EBM encourages providers to integrate the acquired evidence with patient values and preferences, providers may be more likely to increase discussions and share the evidence with their patients. This may in turn reduce their patients' misconceptions and increase overall willingness to use the method. Eventually, the increased consumer demand will encourage providers to change their clinical practices and increase provision of the method.

In Jordan, the EBM program targets health care providers in the private commercial sector. The program reaches providers outside their clinic, after hours, and in a peer-to-peer environment. This may make EBM particularly well suited for reaching private providers, who are less available or interested in attending trainings that reduce their clinical hours and earning potential.

In 2005-2010, a predecessor project (the Private Sector Project for Women's Health-Jordan, or PSP) began working with private practicing doctors who provided family planning services. Providers were invited to participate in the first EBM interventions related to combined oral contraceptives (COC) and Progesterone Only Pills (POP). A pre-post evaluation of the COC EBM intervention in Jordan has shown an increase in the ability of providers to identify specific risks and benefits of COCs correctly, an increase in reported discussion of family planning with clients, and increased willingness among providers to prescribe COCs to nulliparous women.

Given the promising results from the EBM evaluation under PSP, the Ta'ziz project proposed expanding the intervention to the three-month contraceptive injection depot medroxyprogesterone acetate (DMPA), which has had a low acceptance rate among both providers and consumers due to concerns about its side effects, such as spotting, irregular bleeding, and delayed return to fertility. In 2012, the project conducted the DMPA EBM intervention over the course of six months specifically aimed at addressing biases and misconceptions related to DMPA.

C. Study objectives

The purpose of this study is to evaluate the impact of the EBM DMPA intervention on providers' knowledge, attitudes, and reported practices. Specifically, the study is interested in answering the following questions:

- Did the EBM DMPA intervention improve providers' level of knowledge of DMPA and its side effects?

- Did the intervention improve providers' attitudes and their confidence towards the method?
- Did the intervention increase providers' clinical practices, such as discussions and prescriptions of DMPA to clients?

Unlike the pre-post evaluation conducted under PSP, this evaluation uses an experimental study design (randomized control trial) to explore the three research questions. The remainder of this report proceeds as follows: Section II provides some background on EBM and details the existing literature on the impact of similar programs. Section III describes the EBM DMPA intervention in Jordan. Section IV discusses the evaluation methods used. Section V presents and discusses the main findings, and Section VI concludes with program implications and lessons learned.

II. Background on EBM

A. Definition of EBM

EBM has been defined as the "conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (Sackett et al. 1996). The practice of EBM encourages providers to continuously reference updated medical information and knowledge available through pre-appraised resources and combine this external evidence with their individual clinical expertise, clinical circumstance, and patient preference to deliver high-quality health services to patients (Haynes et al. 2002). EBM includes a process called "Critical Appraisal Exercises", during which providers define a patient problem or issue, conduct an efficient literature search, critically appraise the evidence for validity and clinical usefulness, and apply the results to the specific patient problem or issue they face (Sanchaya et al. 2010). Clinical evidence is typically disseminated to the medical community through various methods including professional training courses, workshops, journal clubs, educational outreach visits, and customized electronic databases or interface systems for post-graduates and clinicians to keep abreast of medical knowledge beyond the academic curricula. EBM has become integral to clinical care despite criticisms of the effectiveness of the practice given diverse clinical settings, patient situations, and limited time and resources of health practitioners at point of care (Van Weel and Knottnerus 1999; Straus and McAlister 2000; Vogt et al. 2010; Tomlin et al. 1999; Feinstein and Horowitz 1997; Keirse 2012).

B. Evidence on the impact of EBM interventions

Several studies have evaluated the impact of EBM interventions such as focused seminars and outreach visits on provider knowledge, attitudes, and professional practice. The results of these studies have been mixed. Many of these studies use a pre-post methodology, which captures differences in outcomes before and after the interventions, but does not allow for estimating causal effects because it is not possible to isolate the impact of the intervention from other factors occurring between the pre- and post-intervention surveys. The majority of the studies cited below occur in a developed country setting.

Using a pre-post study, Lucas et al. (2004) found that 18 percent of experienced physicians at a large public teaching hospital in the U.S. changed their treatment method when presented with literature search results based on pre-appraised resources. Straus et al. (2005) also used a

pre-post study at a district general hospital in the U.K. and found that more physicians prescribed evidenced-based therapies to their patients after receiving training on how to practice EBM and access electronic evidence resources. Redfern and Christian (2003) used a pre-post study to evaluate a two-week training program, follow-up seminars, and support in the practice setting to promote the use of evidence-based nursing practices in the U.K. The study found that staff adherence to EBM practices improved and patient outcomes improved in most cases. On the other hand, Jones et al. (2004) found no effect of interactive educational and behavior change sessions to improve pain practices in nursing homes in the U.S. on staff knowledge and attitudes, and mixed evidence on change in staff practice.

Randomized studies of EBM interventions have also been conducted. Some have found positive results such as Dietrich et al. (1992) who studied the impact of daylong evidence based educational meeting in the U.S. on physicians' knowledge, attitudes, and skills related to cancer prevention and early detection. The study found changes in physician behavior (e.g., provision of mammography services) but the intervention was not as effective as other tried interventions. Katz et al. (2004) found positive effects of various programs such as educational training, counseling, and feedback to improve use of smoking cessation guidelines in the U.S. Feldman et al. (2005) and Murtaugh et al. (2005) found that basic email reminders augmented with educational information significantly improved delivery of evidenced-based care of individuals with heart failure with home health care settings in the U.S.

On the other hand, other randomized studies have found no significant effects. McDonald et al. (2005) tested two computer-based reminder interventions promoting evidence-based pain management practices among home care nurses in the U.S., but found no significant differences in nursing pain management practices between control and treatment groups.

O'Brien et al. (2008) conducted a systematic review of 69 studies that evaluated the impact of educational outreach visits on health professionals' practice and patient outcomes and found that educational outreach interventions alone or coupled with other interventions appeared to improve patient outcomes and consistently influence health professionals' prescribing methods. However, the effects were varied and changes small to moderate. Costa and Khanna (2008) further argue that the study results are not reflective of the effect of educational outreach in under-resourced settings, with only three of the 69 evaluated studies held in a developing country setting.

In sum, numerous studies focus on the impact of EBM interventions that aim to disseminate evidence and change provider behavior at point of care. The mixed results from these studies suggest that the effectiveness of the intervention varies by context. Most available studies, however, focus on a developed-country setting and several use pre-post methods with cross-sectional data. This study adds to the literature on the effectiveness of EBM interventions in a different context, and uses a randomized control trial to evaluate the impact.

III. EBM in Jordan

A. The EBM program in Jordan

The Ta'ziz project formed the Jordan Evidence-Based Medicine/Reproductive Health (JEBMRH) Group as the catalyst for the EBM program focusing on modern family planning. The mission of the JEBMRH Group is to:

- Critically appraise research on issues related to reproductive medicine, initially focusing on family planning
- Disseminate best evidence on family planning methods to health providers, patients, and the public
- Inform the Jordanian health provider community about the value of "best evidence" in addressing patient problems related to methods' side effects and health concerns as well as to the benefits of modern methods, including health benefits unrelated to family planning

The group currently has 12 active members, who are leading obstetrics/gynecological practitioners and academics in Jordan. All three of Jordan's leading medical colleges, at the Jordan University of Science and Technology, University of Jordan, and Mutah University, have representation in the group.

The project provided orientation and training on critical research appraisal and the development of Critically Appraised Topics (CAT) following a protocol and a format for concise (evidence) summaries. Subsequently, the group has developed and reviewed nearly 90 CATs on COCs, POPs, injectable contraceptives, and IUDs that address a full range of clinical questions concerning these methods' side effects and benefits. The group is currently working with the project to assemble these CATs into an easy-to-use color-coded notebook reference guide that will include a primer on EBM and resources that clinicians could use to perform their own evidence searches. The notebook will be widely disseminated among the obstetrical/gynecological specialist, general practitioner, and pharmacist communities in Jordan.

In addition, the group is working with the project to post the CATs on medical and health information websites including the Jordan Pharmacists Association website and the Ministry of Health's public information website. Members of the group are also taking other lead roles in evidence dissemination, conducting the roundtable seminars for physicians and pharmacists, and appearing on television and radio interview programs to inform the public about the scientific evidence relating to concerns about modern family planning methods as well as on their health benefits. The JEBMRH Group is currently working on new CATs for implants (focusing on the single rod), vaginal ring, and birth spacing.

B. The DMPA EBM intervention

The project implemented the DMPA EBM intervention over the course of six months (January to June) in 2012. The intervention covered material on DMPA and disseminated scientific evidence about DMPA through roundtable seminars and detailing visits that reinforced the seminars' messages.

The seminars consisted of a two-hour roundtable discussion led by members of the JEBMRH group who presented clinical research findings related to DMPA. The seminars were held

outside of clinical hours. All attendees received a booklet containing 24 CATs on DMPA. The CATs covered issues such as findings on fertility return, anemia, amenorrhea, and other real or perceived side effects of DMPA. The seminars allowed providers to discuss the CATs within the local context, with the overall goal of correcting misconceptions and biases and improving knowledge of evidence-based health benefits of method use.

The detailing visits involved a trained detailer making 15-minute educational outreach visits to individual doctors' offices to review specific information that was discussed during the seminars. These sessions sought to reinforce the availability of evidence to support providers in counseling about DMPA – by addressing concerns about side effects and perceived harm (e.g., delays in returns to fertility), and conveying information about evidence-based benefits (e.g., protective effects against cancer). Detailers attempted to visit each provider twice. The first detailing visit reinforced messages related to DMPA and returns to fertility, and the second visit reinforced messages related to DMPA and amenorrhea.

IV. Methodology

A. Sample

From 2005 to 2010, the PSP project worked with private obstetricians/gynecologists and general practitioners who provide family planning services in Jordan. The project compiled a list of providers that the study team used as the sampling frame for this evaluation. The sample of eligible providers consisted of 267 private health providers in two regions, Amman and Zarqa. The sample did not include doctors practicing in the North and South regions of Jordan because it was logistically difficult to randomize those doctors and provide a widely dispersed treatment group with EBM seminars. About 16 percent of the doctors in the sample are specialists; the rest are general practitioners[1].

B. Random assignment

Using STATA v.12, the sample of 267 providers was randomly assigned to treatment and control groups, stratifying by geographic area, gender, and on whether the providers belonged to the project's network of providers. In total, there were 135 providers in the treatment group and 132 in the control group (Table 1).

Table 1: Random Assignment

	Treatment	Control	Total
Amman	109	108	217
Zarqa	26	24	50
Total	135	132	267

The treatment group was invited to attend the DMPA roundtable seminar and receive two detailing visits. Because it was important for project implementation to continue to engage control group doctors during the six months of the intervention, the control group doctors

[1] Because there are only 44 specialists (out of 267), it was not possible to conduct the analysis in this study separately for specialists and general practitioners.

were also offered two repeat detailing visits during this same period. These were related to COCs and a repeat of the previous year's materials. The control group doctors were not invited to participate in additional seminars. Thus, our comparison between treatment and control compares being offered participation in the DMPA workshop and two DMPA detailing visits with being offered two repeat detailing visits on COCs. No additional information about DMPA was discussed during the COC detailing visits and thus, any differences that arise on knowledge, attitudes, or practices related to DMPA can be attributed to the DMPA intervention.

Random assignment was done prior to data collection and the results were not communicated to anyone outside of the research study team.

C. Data collection

A baseline survey was conducted in December 2011. Survey questionnaires were mailed to all 267 providers and follow-up phone calls were made to providers who did not respond to the mailed questionnaire. The questions asked for specific information on the provider's knowledge of DMPA's side effects, attitudes towards the method, and clinical practices such as discussing DMPA with clients or prescribing it. The response rate for the baseline survey was 72 percent (195 providers), and the difference in the response rates between treatment and control was not statistically significant or large in magnitude (Table 2).

The endline survey conducted in December 2012 collected information similar to the baseline: provider knowledge of DMPA's side effects, attitudes towards the method, and practices. It also collected information such as years of experience, number of patients seen, whether the provider has a dual practice, and the types of family planning methods that the provider has prescribed. Primarily due to the change in the data collection method, the endline response rate was higher than the baseline rate – 87 percent (229 providers). Again, there was no significant difference in survey response rates between treatment and control (Table 2). Of those who were interviewed at endline, 77 percent had completed baseline interviews (not shown).

Table 2: Survey Response Rates

	Treatment (T)	Control (C)	Difference (T-C)	Standard Error
Total evaluation sample	135	132		
Baseline survey response rates	0.72	0.73	-0.01	0.05
Endline survey response rates	0.87	0.85	0.02	0.04

Significant at the 90% (*), 95% (**), 99% (***) confidence level

D. Outcome measures

The study team constructed four outcome measures to assess: (1) providers' knowledge of DMPA (e.g., correct identification of side effects, risks, and benefits), (2) their attitudes towards DMPA (e.g., willingness to recommend DMPA), (3) their self-perceived confidence level (e.g., confidence in discussing DMPA with clients), and (4) their reported clinical behavior or practices (e.g., reported prescription or discussion of DMPA with clients). Each outcome measure was defined as a score and calculated as described below.

To measure provider knowledge and attitudes towards DMPA, the surveys asked respondents to rate knowledge and attitudes statements using a five-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. Examples of these statements are: "*Use of DMPA is positively associated with weight gain*", or "*I would have no hesitation recommending DMPA to a healthy woman*". The study team assigned values ranging from -2 to +2 to each of the knowledge and attitudes items, where '+2' denotes the most desirable item response (e.g., "*I strongly agree that I would have no hesitation recommending DMPA to a healthy woman*") and -2 denotes the least desirable response. The team created a ***Knowledge Score*** and an ***Attitudes Score*** for each provider using the simple average of these items. Following Kling et al. (2007), the scores were standardized by subtracting the mean and dividing by the standard deviation of the score among the control group, such that the control group's mean score is zero and the standard deviation one. This method facilitates the interpretation of the impact coefficients in the regression (see next section).

To measure self-perceived confidence in DMPA, the surveys asked respondents to provide answers on three questions using a 10-point scale. An example of these questions is: "*How comfortable do you feel prescribing DMPA for your clients*". The team formed the simple average of these three items and created a ***Confidence Score*** that was also standardized according to Kling et al. (2007). Confidence outcomes were only collected at endline.

To measure reported clinical practices related to DMPA, the surveys asked respondents to report on whether they have any DMPA stock at their clinic, as well as on the number of times they have discussed DMPA with or prescribed it to their clients during the month prior to the survey. The team standardized each of these three measures, computed a ***Practice Score*** using the simple average, and then similarly applied Kling et al. (2007) to standardize the Practice Score among the control group.

Table A in the Appendix shows the items of each score and the baseline means and standard deviations for the overall sample, as well as separately by treatment and control.

E. Balance across treatment and control

Random assignment ensures that the treatment and the control groups are equivalent on both observed and unobserved characteristics at baseline. As a result, it is possible to attribute the differences observed between the two groups at endline to the actual intervention rather than to pre-existing differences between the treatment and control groups. It is therefore important to test for balance across treatment and control to check on the success of the randomization. If the randomization worked well, both groups are expected to be similar in characteristics. More than two thirds of providers in the sample are female, with an average of 25 years of clinical experience, 17 of which are in family planning (Table 3). The data show that there are no significant differences between treatment and control group doctors on indicators of patient load or concerning the types of methods they provide at their clinic, showing that the sample is well balanced.

At baseline, the treatment and control groups were similar concerning knowledge of DMPA's side effects, attitudes towards DMPA, and reported practices (Table 4). Providers had similar overall scores at baseline. Around 20 percent of doctors in the treatment group had DMPA stock at their clinic at the time of the survey, compared to 24 percent of doctors in the control group. The differences are not statistically significant. The average number of times providers discussed DMPA with clients is comparable across both groups (5.1 times in the treatment and 5.7 times in the control). Likewise, the average number of times providers prescribed

DMPA is not statistically different across both groups (2.0 in the treatment and 2.4 in the control).

Table 3: Characteristics of Providers

	Treatment (T)	Control (C)	Difference (T-C)	Standard Error
Female [(1)]	0.68	0.69	-0.01	0.06
Average years of clinical experience	24.6	24.8	-0.2	1.1
Average years of clinical experience in family planning	17.1	17.6	-0.5	1.2
Doctors with dual practice	0.14	0.09	0.05	0.04
Method provision/prescription in clinic				
Copper intrauterine device (IUCD)	0.93	0.95	-0.02	0.03
Hormonal intrauterine system (Mirena®)	0.67	0.62	0.05	0.06
Implant (Implanon®)	0.32	0.29	0.03	0.06
Combined oral contraceptive (COC) pill	0.97	0.99	-0.02	0.02
Progestin-only pill (POP)	0.94	0.95	-0.01	0.03
Vaginal ring (NuvaRing®)	0.41	0.39	0.02	0.06
Condom	0.94	0.97	-0.03	0.03
Female sterilization (e.g. bilateral tubal ligation)	0.57	0.56	0.01	0.07
Male sterilization (vasectomy)	0.08	0.09	-0.01	0.04
N	117	112		

Source: Endline survey
Significant at the 90% (*), 95% (**), 99% (***) confidence level
(1) N=137 for the control group; N=135 for the treatment group

Table 4: Baseline Statistics

	Treatment (T)	Control (C)	Difference (T-C)	Standard Error
Knowledge Score [(1)]	0.18	0.00	0.18	0.15
Attitudes Score [(1)]	0.15	0.00	0.15	0.15
Practice Score [(1)]	-0.15	0.00	-0.15	0.12
Availability of DMPA stock at clinic	0.20	0.24	-0.04	0.06
Average # times discussed DMPA with clients in past month	5.1	5.7	-0.6	1.1
Average # times prescribed DMPA in past month	2.0	2.4	-0.4	0.5
N [(2)]	96	97		

Source: Baseline survey
Significant at the 90% (*), 95% (**), 99% (***) confidence level
(1) For all scores, the control group mean is zero and the standard deviation is one.
(2) The sample size ranges from 89 to 96 for the control group and from 91 to 97 for the treatment group because of missing observations

F. Estimation strategy

The impact of the EBM intervention on outcomes (Y_i) is estimated in a simple specification as indicated in Equation (1).

$$Y_i = \alpha_1 + \beta_1 T_i + \varepsilon_{1_i} \qquad \text{Eq (1)}$$

where T indicates if provider *i* was assigned to the treatment group and Y is the outcome variable of interest. The coefficient of interest is β_1. A positive and statistically significant coefficient implies that the intervention had a positive impact on outcomes. Because assignment to the treatment group was random, the error term is expected to be uncorrelated with T allowing for causal inference.

Note that β_1 is the intention to treat (ITT) estimate. The ITT estimates measure the differences in outcomes between providers assigned to the treatment group, including those who did not comply or participate in the intervention, and providers assigned to the control group. Another commonly used estimate is the treatment on the treated (TOT) effect. The TOT estimates measure the differences in outcomes between providers assigned to the treatment group who actually participated in the intervention and providers assigned to the control group. The TOT estimates are generally higher in magnitude than the ITT estimates. However, because there is usually selection into treatment, the TOT estimates are also biased[2]. Thus, ITT has two strong rationales. First, it is necessary to preserve the strength of the randomization and the balance between the treatment and control groups (Sainani 2010). This balance may be lost if some providers are excluded from the analysis or analyzed according to how they self-selected rather than how they were randomized. The second rationale for this approach is that it estimates impact in a real-world setting, where some providers may not comply with the intervention. Thus, ITT analysis provides information about the potential effects of the intervention in practice.

The study team ran a number of regressions with different outcomes Y, including the standardized scores described in Section D above and the individual items that make up the scores (see Appendix). When running the regressions on the standardized scores, the resulting coefficient estimates are the "mean effect sizes" and, due to the standardization, they capture the average impact in terms of standard deviations of the outcome measure in the control group. The standardization facilitates comparison of impact magnitudes across outcomes.

The results described in Section V below are robust to the addition of baseline covariates and other control variables such as gender, area (e.g., Amman versus Zarqa), and patient volume, to the regression specification.

One potential threat to the validity of this specification is the risk of spillover effects from treatment to control. For instance, control group doctors may obtain specific information from the CATs by interacting or communicating with treatment group providers. However, this is unlikely as providers in the sample have their own private clinics and do not share practices.

[2] The study team also calculated the TOT estimates. To do so, the team instrumented participation in the EBM intervention (defined as receiving both detailing visits and attending the seminar) with the treatment assignment using two-stage least squares (2SLS). These estimates are higher than the ITT estimates. However, because there was provider selection into treatment, they are also biased estimates.

V. Main Findings

A. Compliance with the EBM intervention

Participation in the EBM DMPA intervention varied across providers assigned to the treatment group (Table 5). Approximately 45 percent of the treatment group doctors invited to the EBM seminar participated in the seminar. This compares to a 66 percent and a 71 percent attendance rate in COC and POP seminars, respectively. Only two control group doctors (1.5 percent of the total) attended the DMPA seminar uninvited. On the other hand, 82 percent of treatment group doctors received the first detailing visit related to DMPA and return to fertility, while 79 percent received the second detailing visit related to amenorrhea. Overall, about 76 percent of the treatment group doctors received both detailing visits. According to the intervention monitoring data, having a busy schedule was the most commonly cited reason for not participating in the seminar. Overall, 38.5 percent of the treatment group received the complete EBM intervention, defined as receiving both detailing visits and attending the seminar.

Table 5: Participation in the DMPA EBM Intervention

	Treatment	Control
Attended the EBM seminar	0.452	0.015
Received first detailing visit on DMPA	0.822	0
Received second detailing visit on DMPA	0.793	0
Received both detailing visits on DMPA	0.763	0
Received at least one detailing visit on DMPA	0.852	0
Attended the seminar AND received both detailing visits on DMPA	0.385	0
Received at least one detailing visit on COC	0	0.848

N=135 for treatment and N=132 for control.

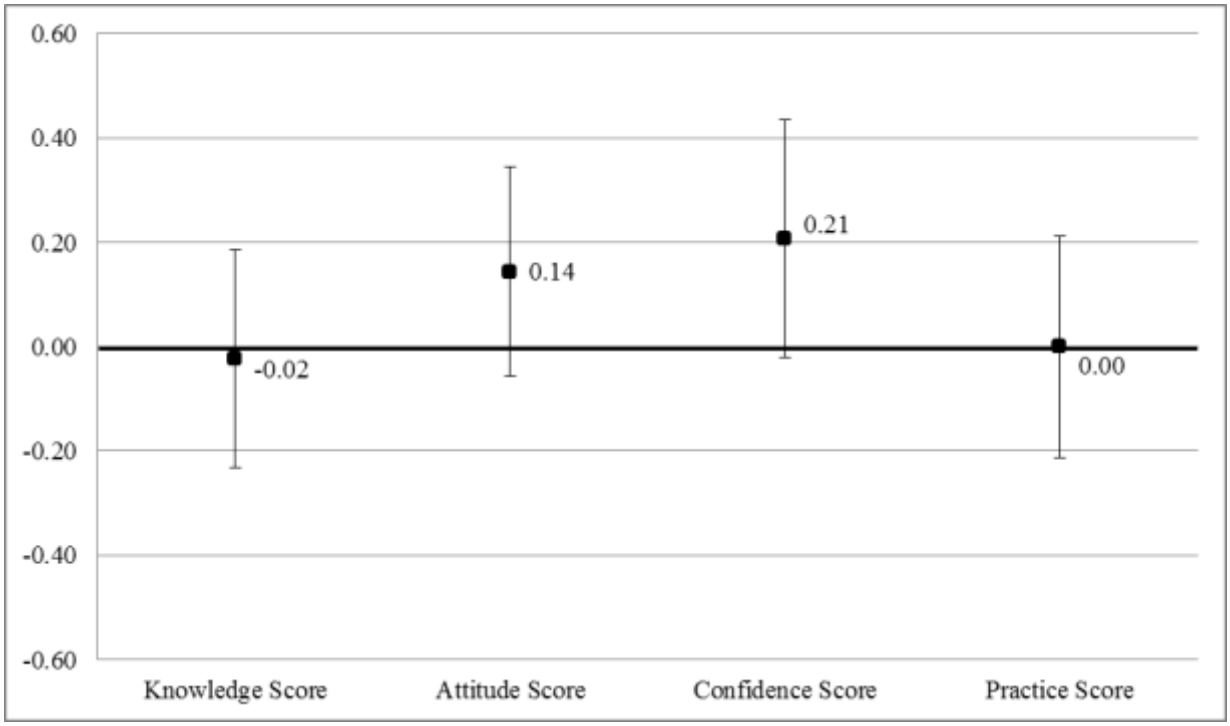
B. Impact on overall scores

Figure 1 shows the impact estimates of the EBM intervention on overall provider outcomes, as measured by the four scores described in Section IV. Each black square represents the value of the coefficient β_1 resulting from the regression on each score measure. A positive coefficient (thus a square above the zero horizontal line) indicates that the intervention had a positive effect moving providers from misconceptions to better knowledge on DMPA, from negative to positive attitudes, from less to more confidence towards DMPA, and from less to more (reported) clinical practices related to DMPA. Figure 1 also shows the 90 percent confidence intervals for each estimated coefficient. When the confidence interval contains the value '0.00', the impact estimate is *not* statistically significant from zero.

Figure 1 shows no detectable impact of the EBM intervention on knowledge or on reported clinical practices. The point estimates on the Knowledge and Practice Scores are almost zero. On the other hand, the Attitudes Score is on average 0.14 standard deviations higher in the treatment group compared to the control group (equivalent to a 15 percent difference). Likewise, the Confidence Score is on average 0.21 standard deviations higher in the treatment group (equivalent to a 6 percent difference). This means that the providers who were assigned to participate in the EBM on DMPA scored higher on average than providers who were assigned not to participate in the intervention. While these results suggest that the impact of the EBM intervention on attitudes and confidence is positive, the estimates are not

statistically significant at traditional confidence levels. In other words, given the sample size in this study, it is not possible to ascertain that these positive differences are not due to pure chance.

Figure 1: Impact of EBM Intervention on Provider Outcomes



Coefficients from Equation (1); Error bars at the 90% confidence level; Robust standard errors; For all scores, the control group mean is zero and the standard deviation is one; the Y-axis measures the difference in standard deviations of the outcome variable between the treatment and the control group; N= 229 providers.

When adding baseline covariates and other control variables to the regressions, such as gender, area (Amman versus Zarqa), and patient volume, the impact estimates are slightly smaller in magnitude but display the same pattern as in Figure 1 above. Coefficients on the Attitudes and Confidence Scores remain positive but are not significant.

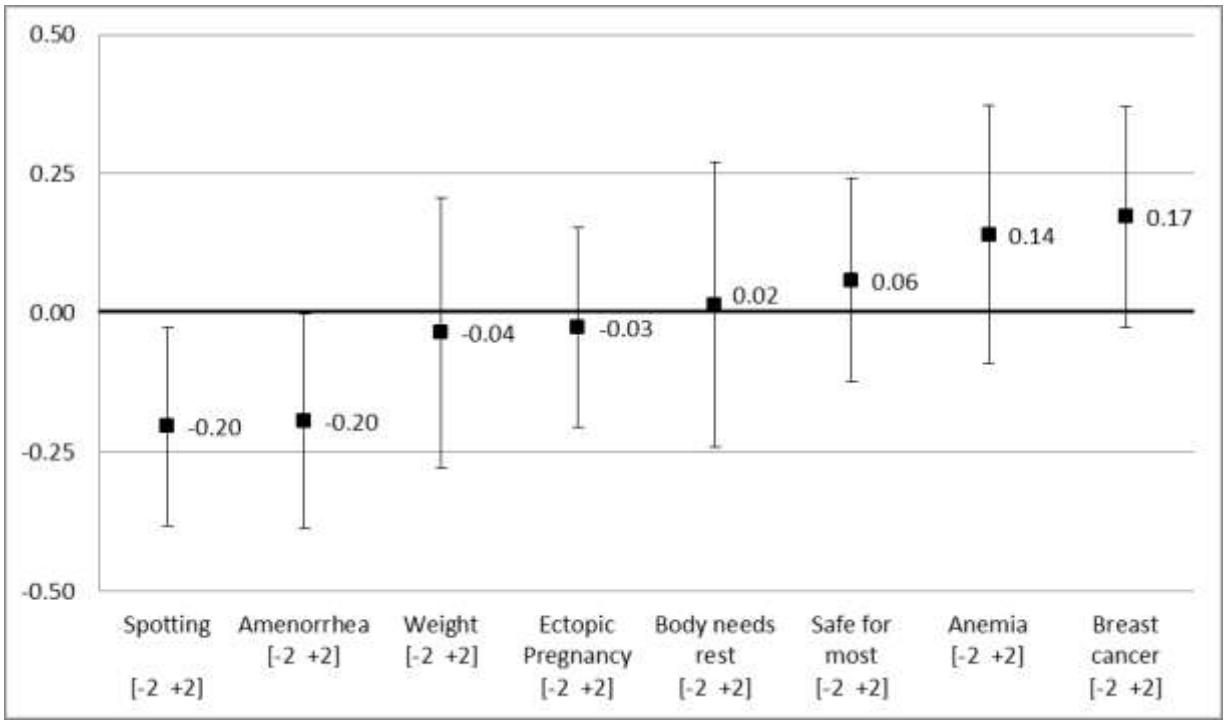
C. Impact on Knowledge, Attitudes, Confidence, and Practice Items

This section presents the impact estimates for the individual items that make up the Knowledge, Attitudes, Confidence, and Practice scores. Given a large number of hypothesis tests were performed (one for each item), some of the statistical differences detected between treatment and control may be due to random chance alone. Thus, as the number of comparisons between treatment and control increases, the two groups are more likely to appear to differ in at least one attribute. This is referred to as the multiple comparisons problem. The problem may occur when a large number of hypothesis tests are conducted across many outcomes, which can lead to spurious statistically significant impact findings (Schochet 2008). The study team therefore cautions readers in placing too much emphasis on the few statistically significant results presented in this section. The impact estimates for the scores presented in the previous section remain the favored study results.

Figure 2 shows the impact estimates of the EBM intervention on knowledge and misconceptions related to various real or perceived DMPA side effects. These items make up the Knowledge Score. All knowledge items are measured using a five-point Likert scale

ranging from 'strongly agree' to 'strongly disagree'. The items range from -2 to +2, where '+2' denotes the most desirable item response and -2 denotes the least desirable response. Table A in the Appendix shows the full statements making up the various knowledge items (abbreviated in this Figure).

Figure 2: Impact of EBM Intervention on Knowledge



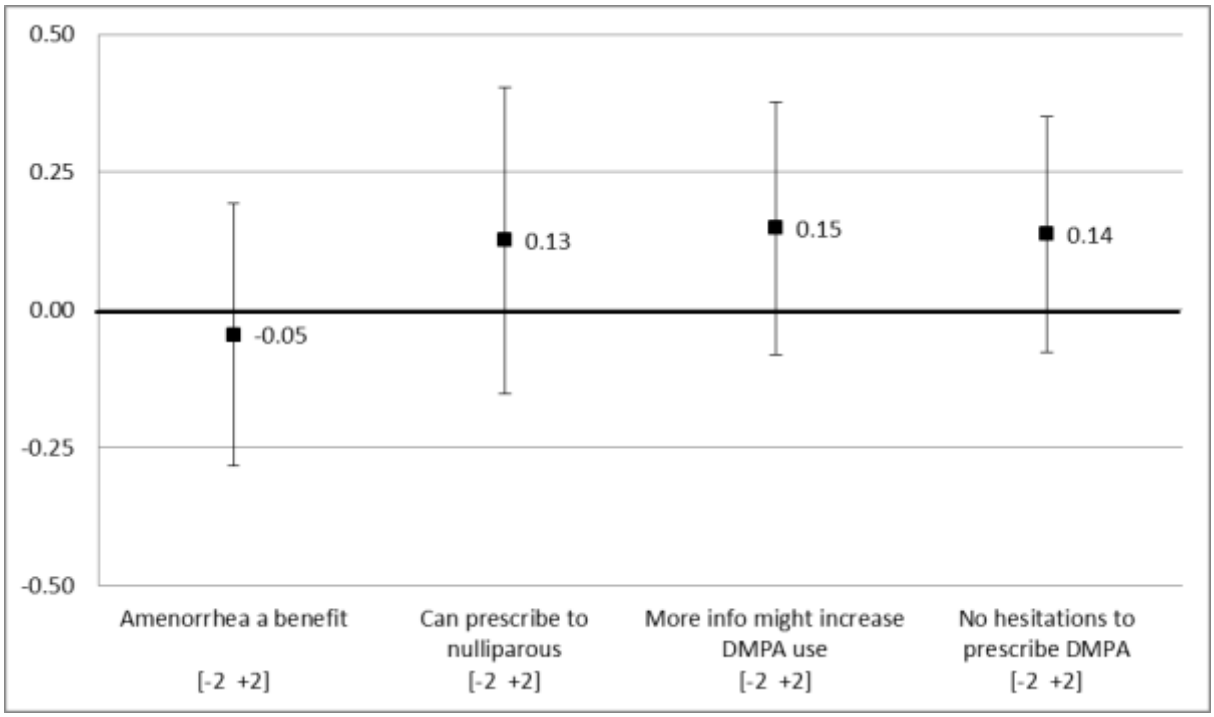
Coefficients from Equation (1); Error bars at the 90% confidence level; Robust standard errors; Knowledge measures range from -2 to +2, where '+2' denotes the most desirable item response and -2 denotes the least desirable response; the Y-axis measures the difference in standard deviations of the outcome variable between the treatment and the control group; N= 229 providers.

Each black square in Figure 2 represents the value of the coefficient β_1 resulting from the regression on each individual item. A positive coefficient (thus a square above the zero horizontal line) indicates that the intervention had a positive effect moving providers from misconceptions to better knowledge. When the confidence interval contains the value '0.00', the impact estimate is *not* statistically significant from zero. Figure 2 shows that in general, providers in the treatment group are more likely to answer correctly questions related to breast cancer, anemia, and safety of DMPA than providers in the control group do. Treatment estimates are almost zero on questions related to weight, ectopic pregnancies, and on whether the body needs rest after extended use of DMPA. While the general direction of the treatment effect is positive for some of these outcomes, the differences are not statistically significant.

Interestingly, providers in the treatment group are *less* likely to identify correctly amenorrhea and spotting as the two actual side effects of DMPA. The average difference between treatment and control on the [-2 +2] Likert scale is -0.20 for the spotting and the amenorrhea-related questions, and these estimates are significant at the 90 percent confidence level. In fact, amenorrhea and spotting are two common concerns with DMPA, and these estimates may imply that providers are becoming less negative about DMPA. However, more information is needed to understand whether this is reflective of some level of misinterpretation of the medical evidence that is being disseminated through the DMPA EBM intervention, or whether this is an indication of reporting bias.

Figures 3 and 4 show impact estimates for the items that make up the Attitudes Score and the Confidence Score, respectively. Figure 3 shows that compared to the control group, on average providers in the treatment group are more likely to disagree that DMPA should not be prescribed to nulliparous women (difference of 0.13 equivalent to a 52 percent increase compared to the control), are more likely to agree that more information might increase use of DMPA (difference in magnitude of 0.15 equivalent to a 21 percent increase compared to the control), and are more likely to have no hesitations prescribing DMPA to clients (difference in magnitude of 0.14 equivalent to a 14 percent increase compared to the control). These differences, though positive, are not significant at the 90 percent confidence levels.

Figure 3: Impact of EBM Intervention on Attitudes

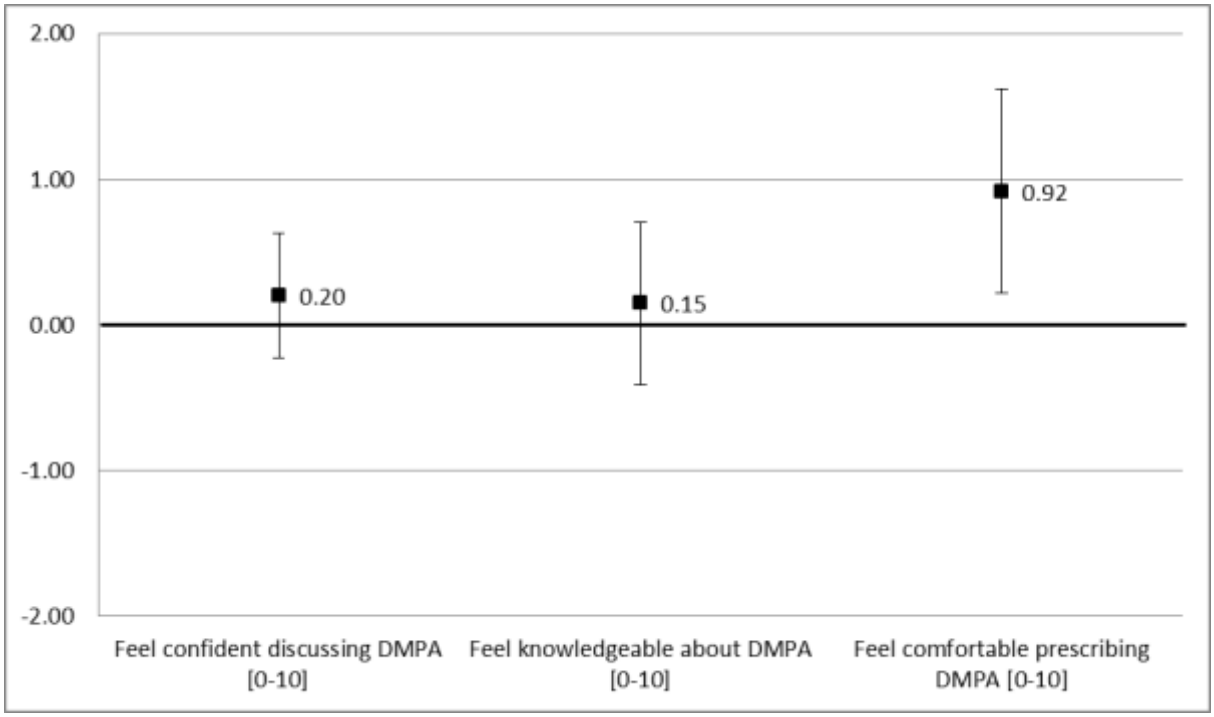


Coefficients from Equation (1); Error bars at the 90% confidence level; Robust standard errors; Attitudes measures range from -2 to +2, where '+2' denotes the most desirable item response and -2 denotes the least desirable response; the Y-axis measures the difference in standard deviations of the outcome variable between the treatment and the control group; N= 229 providers.

Figure 4 shows estimates on three self-reported confidence items that are rated on a [0 10] scale. There is no evidence of a significant difference in measures related to knowledge of DMPA and comfort discussing the method with patients. However, the impact on level of comfort prescribing DMPA is larger (difference in magnitude of 0.92 equivalent to a 15 percent increase compared to the control) and significant at the 95 percent confidence level.

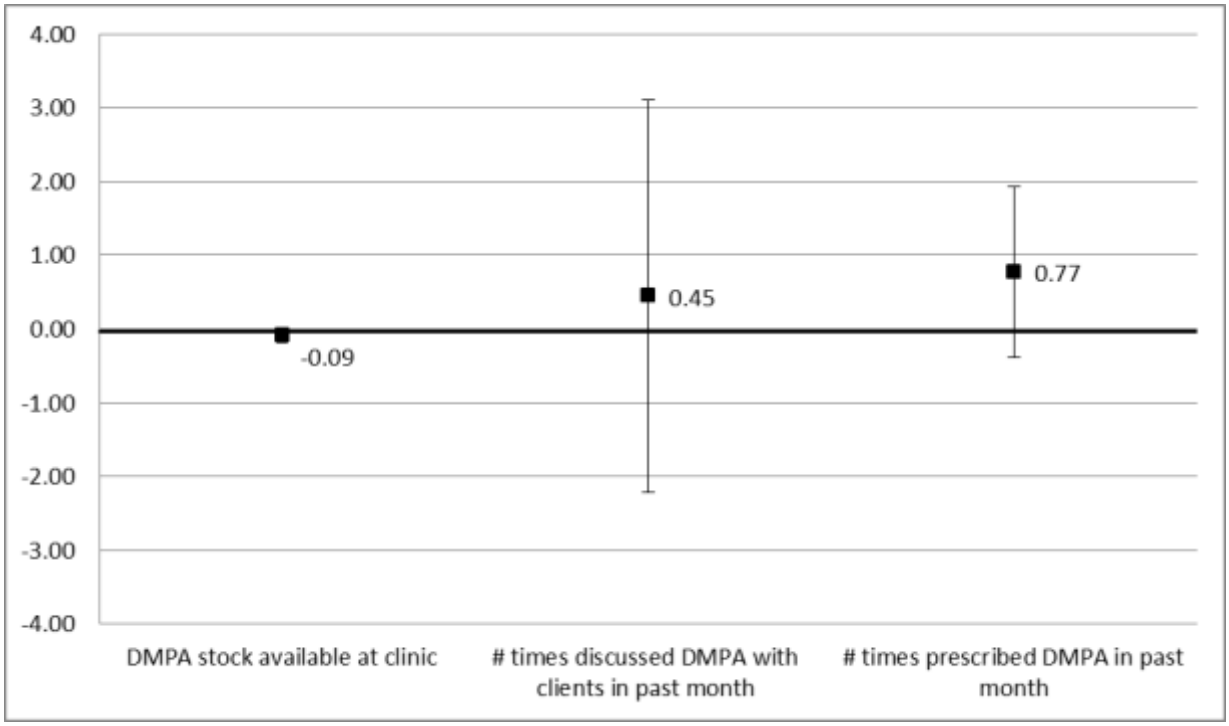
Figure 5 shows impact estimates on measures of reported clinical practices. These items make up the Practice Score. A positive coefficient (thus a square above the zero horizontal line) indicates that the intervention had a positive effect moving providers from less to more (reported) clinical practices related to DMPA. Providers in the treatment group are somewhat more likely to discuss DMPA with the clients, and slightly more likely to prescribe DMPA. However, these are not statistically significant changes in discussion or prescription habits. In addition, there are no significant differences between control and treatment groups on the availability of DMPA stock in clinics.

Figure 4: Impact of EBM Intervention on Confidence



Coefficients from Equation (1); Error bars at the 90% confidence level; Robust standard errors; Confidence measures range from 0 to +10, where '+10' denotes the most confident; the Y-axis measures the difference in standard deviations of the outcome variable between the treatment and the control group; N= 229 providers.

Figure 5: Impact of EBM Intervention on Reported Practices



Coefficients from Equation (1); Error bars at the 90% confidence level; Robust standard errors; the Y-axis measures the difference in standard deviations of the outcome variable between the treatment and the control group; N= 229 providers.

D. Selection into the EBM seminar

Since seminar attendance was low, the study team explored the data to understand better the differences between the providers who complied with the intervention and those who did not. The data provide evidence of self-selection in the seminar (Table 6). A comparison of baseline characteristics between providers in the treatment group who participated in the seminar and those who did not participate shows that providers who attended the seminar are significantly more likely to be more knowledgeable on DMPA than those who did not attend. The average baseline Knowledge Score for those who attended the seminar is 0.47 standard deviations higher, equivalent to a 54 percent difference. Providers who attended the seminar are also more likely to have attitudes that are more positive and higher confidence levels, though these estimates are not statistically significant. Interestingly, female providers are significantly more likely to attend the seminar than their male counterparts are. Years of experience or having a clinic in Amman do not seem to matter.

Table 6: Baseline Statistics, by Seminar Attendance

	Attended seminar (A)	Did not attend seminar (B)	Difference (A) - (B)	Standard Error
Baseline Knowledge Score [(1)]	0.474	0.000	0.474**	0.209
Baseline Attitudes Score [(1)]	0.207	0.000	0.207	0.201
Baseline Practice Score [(1)]	0.102	0.000	0.102	0.210
Female	0.770	0.608	0.162**	0.079
Amman	0.836	0.784	0.052	0.068
Years of family planning experience	17.0	17.3	-0.288	1.574
Sample range [(2)]	46 -61	50-74		

Significant at the 90% (*), 95% (**), 99% (***) confidence level
(1) For all scores, the group of providers who did not attend the seminar has a mean of zero and a standard deviation of one
(2) The sample size ranges from 61 to 46 in column A and from 50 to 74 for column B because of missing observations.

VI. Conclusions and Program Implications

This study used an experimental design approach to measure the impact of an EBM intervention on provider knowledge, attitudes, and reported clinical practices. While, the primary purpose of the EBM intervention was to provide the medical community with the correct evidence-based information on DMPA, there was no detectable change in the level of knowledge of side effects among providers. Despite some evidence of a positive impact on provider attitudes and confidence levels, reported practices also remained unchanged.

A few possible factors may help explain these findings. First is weak compliance with the EBM intervention, most notably the roundtable seminar. A low rate of attendance at the seminars meant that less than half of providers assigned to the treatment group actually received the complete EBM intervention. This may have dampened the true impact of the program and thus had implications on the ability to detect effects on provider knowledge, and in turn, on the ability to detect changes in provider attitudes and practices. Future iterations of EBM activities need to ensure better attendance and attention to EBM seminars. In the absence of national requirements for continuing medical education, EBM implementers may consider a mix of incentives to encourage attendance further among busy health care

providers. It is also important to improve the monitoring of the program in order to address low participation rates early on in the intervention and take action.

Second, the intensity of the intervention may be too weak. One two-hour long roundtable seminar and two shorter detailing visits over the course of a six-month period may not be a long enough or aggressive enough intervention to lead to a detectable change in provider knowledge, attitudes, and practices. Moreover, there was a significant time lag – about six months – between the intervention and the endline survey that tested for provider outcomes. Without regular follow-up throughout these six months, some of the knowledge acquired during the DMPA seminars could have been lost. A more intensive and extended intervention may be required in order to show large shifts in knowledge and attitudes and allow these corrections for biases towards DMPA to lead to changes in provider practices.

Third, there is consumer bias against DMPA, which may be limiting providers' ability to affect uptake among distrustful clients. Injectable contraceptives are in fact among the least popular family planning methods in Jordan. There are significant concerns among Jordanian women regarding some of the common short-term side effects of DMPA, including spotting, irregular bleeding, and delayed fertility returns. Faced with low demand and negative consumer attitudes towards DMPA, providers may be resistant to changing their own attitudes and clinical practices, and thus continue to favor other methods despite the research evidence presented in EBM trainings. EBM interventions alone may not be enough to shift attitudes and practices among providers, especially when providers are encouraged to take patient values and preferences into consideration. EBM interventions may be best coupled with complementary interventions specifically targeted at reducing consumer bias.

Since seminar attendance was low, the study team explored the data to understand better the differences between the providers who complied with the intervention and those who did not. There is evidence of self-selection into the roundtable seminar: providers who attended the seminar were more likely to have higher knowledge at baseline. Providers who participated in the DMPA intervention already exhibited a higher level of knowledge. These findings confirm that studies where participants can self-select into treatment and control groups will most likely lead to biased results.

This study has a number of limitations. First, survey responses were solely based on self-reports, which may not accurately reflect actual practices among providers. It was not possible in this particular context to measure provider behaviors and method uptake using mystery client surveys, vignette surveys, or client exit interviews. Second, the low participation rate in the EBM intervention is problematic, further reducing an already small sample size and limiting the ability to detect even small to moderate effect sizes.

Addressing supply-side constraints, such as the lack of knowledge or unfounded misconceptions among private providers, is essential to improve access to health services. In the case of family planning, it is important to understand what type of interventions could improve provider knowledge, reduce provider bias, improve provider practices related methods and in turn increase use of modern family planning. EBM provides an approach to changing provider knowledge, attitudes, and behavior and may represent a valuable investment in improving the delivery of reproductive health services. While this study fails to detect an impact of the program, this particular EBM intervention was focused on an unpopular hormonal method in a challenging environment. Targeting health care providers to increase participation in EBM trainings and simultaneously addressing the high level of

consumer bias against certain methods through consumer-directed interventions may be needed to increase participation and change clinical behavior.

APPENDIX

Table A: Outcome Measures at Baseline

	Overall sample			Treatment			Control		
	Mean	**S.D.**	**N**	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**	**N**
Knowledge of DMPA*									
Women are at a higher risk of ectopic pregnancy if they use DMPA long term	0.77	0.93	192	0.72	0.96	96	0.81	0.90	96
DMPA use is associated with an increased incidence of breast cancer	0.85	0.97	193	0.85	1.03	96	0.85	0.92	97
Women who use DMPA are less likely to suffer from anemia	0.64	0.98	193	0.77	0.92	96	0.52	1.02	97
From time to time, a woman using DMPA should give her body a rest	-0.18	1.26	192	0.06	1.28	96	-0.42	1.19	96
Use of DMPA is positively associated with weight gain	0.09	1.01	192	0.04	1.00	96	0.15	1.02	96
DMPA use is safe for most healthy women	1.13	0.77	191	1.16	0.87	95	1.10	0.66	96
Women who use DMPA are more likely to experience amenorrhea**	---	---	---	---	---	---	---	---	---
Women who use DMPA are more likely to experience spotting**	---	---	---	---	---	---	---	---	---
Attitudes towards DMPA*									
For some women, amenorrhea can be a benefit	0.63	1.10	191	0.79	1.04	95	0.48	1.13	96
I should not prescribe DMPA to nulliparous women who wish to delay childbirth	-0.65	1.24	191	-0.57	1.28	94	-0.72	1.21	97
If women in Jordan had more information about DMPA, more women might accept its use	0.85	1.05	182	0.76	1.11	88	0.93	0.99	94
I would have no hesitations to recommend DMPA to a healthy woman who wanted to use this method	0.95	1.04	192	0.98	0.99	96	0.93	1.09	96
Perceived confidence towards DMPA									
How knowledgeable do you feel about DMPA?	---	---	---	---	---	---	---	---	---
How confident do you feel discussing DMPA with clients?	---	---	---	---	---	---	---	---	---
How comfortable do you feel prescribing DMPA as a contraceptive method to your clients?	---	---	---	---	---	---	---	---	---
Baseline Practices									
Availability of DMPA stock at clinic (binary)	0.22	0.41	183	0.20	0.40	94	0.24	0.43	89
Average # times discussed DMPA with clients in past month	5.41	7.57	187	5.10	5.76	94	5.73	9.06	93
Average # times prescribed DMPA to clients in past month	2.19	3.62	184	2.00	3.49	91	2.38	3.75	93

S.D. = Standard Deviation.

**Values range from -2 to +2, where '+2' denotes the most knowledgeable or desirable response and -2 denotes the least knowledgeable or desirable response; **These outcomes were not collected at baseline.*

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