International Journal of Gender, Science and Technology
http://genderandset.open.ac.uk

An Exploration of Women Academic Scientists' Experiences with Gender in North Africa and the United States

Jessica Greene[1] and Geraldine Richmond[2]

George Washington University[1] and University of Oregon[2], US

ABSTRACT
This exploratory research was conducted in conjunction with a research collaboration workshop in Morocco in March, 2013 which gathered 28 women scientists from Morocco, Algeria, Tunisia, and the United States. In-depth interviews, conducted with 14 North African and 8 American scientists, found that North African and American women scientists had very different experiences with gender in the workplace and at home. North African women reported better representation of women in their science departments and equity in terms of salary and resources, whereas most American women felt they had to "push" to get to equality in the workplace. North African women reported challenging relationships with their women colleagues, while American women reported seeking out women scientists for support. At home, North African women reported having close to full responsibility for child and home care, which many said resulted in less engagement in research than their male peers and reluctance to take on leadership roles. In contrast, American women reported something approximating an equal partnership in handling home and child responsibilities with their husbands, which they viewed as enabling their professional success.

KEYWORDS
Women in STEM; North Africa; women scientists; gender; academia

An Exploration of Women Academic Scientists' Experiences with Gender in North Africa and the United States

INTRODUCTION

While there has been extensive research examining women scientists' experiences in academia in the United States and Europe, there have been few examinations of women scientists'coach experiences in developing countries, particularly in North Africa (Bilimoria, Joy, & Liang, 2008; De Welde & Laursen, n.d.; Rees, 2001; Stockard, Greene, Lewis, & Richmond, 2008). This study explores Algerian, Moroccan, and Tunisian women scientists' experiences with gender in the workplace and at home, and contrasts their experiences with that of US women scientists. The research was conducted in conjunction with a March 2013 research collaboration workshop in Casablanca, Morocco conducted by COACh, a US based grass-roots organization that works to improve career success for women scientists in academia. More information on COACh can be found at their website: http://coach.uoregon.edu/coach/.

BACKGROUND

Little research has examined women scientists' experience in the workplace in Algeria, Morocco, or Tunisia. Articles focusing broadly on women in the Muslim world, suggest that there are substantial social and cultural barriers to women's participation in higher education, particularly in the sciences, and that career opportunities for female scientists are limited (Hassan, 2000; Segal, 1996).

However, the few reports specific to these North African countries suggest a more positive story, at least with regards to female representation in the sciences. Nora Berrah, an American academic who grew up in Algeria, wrote that in 1979-80 in Algeria, 40% of her undergraduate peers in physics were female, and that she had a woman physics professor as well as female teaching assistants (Berrah; 2006). Tiliouine reports that women made up 34% of university faculty in Algeria in 2004-5 and in 2006 Berrah wrote that women made up a higher percentage of physics faculty in Algeria than they did in the United States (Berrah, 2006; Tiliouine, 2014).

In Tunisia, which is described as being "a leader in the region in terms of gender equality," (Megahed & Lack, 2011 p. 401) women were reported to make up 40% of all college professors in 2010 (Cheikh, 2010). While the gender breakdown is not available for academics in the sciences, among university undergraduate students in Tunisia, women make up 58% of science students, 48% computing students, and 32% engineering students (Cheikh, 2010). Additionally, an international study of 15 year olds found that girls in Tunisia were 1.7 times as likely as girls in the United States to think their career would be in computing, engineering, or mathematics (Sikora & Pokropek, 2012).

International comparative education statistics also present a largely favorable picture of girls' equity in education in these North African countries. Girls outnumber boys in tertiary education in Algeria and Tunisia, while in Morocco girls are approaching parity (United Nations, 2014). The *Trends in International Mathematics and Science Study* found that girls outperformed boys in the 4th grade science assessment (for children approximately 10 years old) in Tunisia and Morocco (Algeria was not included) (Martin, Mullis, Foy, & Stanco, 2012). But by 8th grade (for children approximately 14 years old), girls in Tunisia substantially underperformed their male counterparts. Labor statistics, however, present a contradictory picture. On the one hand, according to UNESCO, women make up approximately one-third of science, technology, and engineering researchers in Morocco and Algeria, and just over half in Tunisia (UNESCO, 2014). Among researchers in the natural sciences, Algeria and Morocco report women make up 44% and 41% respectively (no data was available for Tunisia), while levels were lower for engineering and technology (32% and 28%). However, across the workforce as a whole, men earn approximately three times what women earn in all three countries (Al-Rasheed et al., 2009).

In comparison to the not very clear picture of representation of women in science academic departments in North Africa, in the United States there is longitudinal data on faculty make-up in the sciences. In 2010, women made up 21% of physical science faculty and 17% of engineering faculty (National Science Board, 2014). The percentages of women faculty have been increasing quickly. In 2003, only 15% of physical science faculty members were women, and 11% of engineering faculty. Despite the increases in female representation in the academic sciences, among children, girls are still underperforming boys in science assessments. In the 2011 TIMSS assessment, boys scored 10 points higher on average than girls in 4th grade and 11 points higher in 8th grade (Martin et al., 2012). Among 15-year-olds, boys were 3.5 times more likely than girls to envision a career in computing, engineering, or math (Sikora & Pokropek, 2012).

This study uses qualitative approaches to better understand the experiences of women scientists from Algeria, Morocco, and Tunisia in the workplace and at home, and it contrasts their experiences with that of US women scientists. While limited statistics suggest that North African women are better represented in the sciences as students and faculty members, there is very little information about North African women's experience with equity in the work place, women in leadership, collegial relationships, and work-life balance. This study, which was conducted in conjunction with a Research Partnership Workshop on Water, Energy and the Environment for women scientists from Algeria, Morocco, Tunisia, and the United States, seeks to explore women scientists' experiences in these areas.

METHODS

Setting

The Research Partnership Workshop on Water, Energy and the Environment was hosted by COACh, a US-based organization that works to improve career success for women scientists in academia. With funding from the US State Department, COACh gathered 20 women scientists from Algeria, Morocco, and Tunisia (4, 12,

and 4 respectively) together with 8 women scientists from the United States in Casablanca, Morocco for 2½ days in 2013 to build research partnerships. The workshop was structured so that the women would get to know each other both professionally and personally, would learn about scientific research in each of the four countries represented (e.g. key topics, career progression, common obstacles), and have time to develop research collaborations for the future.

COACh (originally the Committee on the Advancement of Women Chemists, but now simply "COACh") was started in 1997 by a group of senior women chemistry professors to address the problem of women chemists in the United States not advancing in their academic careers at the same speed as their male colleagues. Since its inception, COACh's goal has been to support women scientists' career success through conducting professional development workshops on topics such as leadership, negotiation, and communication. While COACh's initial focus was on women chemists in the US, it quickly broadened its focus to include other academic fields where women are underrepresented. Over the last several years, COACh has begun working outside of the United States, in Africa, South America, the Caribbean, and Asia to build scientific leadership capacity and research collaborations in countries where there is substantial need.

Approach

We conducted in-depth interviews with participants in the research partnership workshop to explore participants' experiences as women scientists - both in the workplace and at home. The interviews were augmented by data collected by the authors who observed the workshop sessions, meals, and outings. The intention of the workshop was to build professional and personal connections among the women participants, and as a result, a very high degree of trust was established within the group. These interviews benefited from the trust established among the workshop participants.

The first author conducted in-depth interviews with 14 of the 20 North African women scientists during the workshop (2 Algerian interviews, 3 Tunisian, and 9 Moroccan). The interviews were all conducted in English, they typically lasted 30 minutes, and were audio recorded. There were 2 group interviews with North African scientists. One interview was with 2 participants, and the other with 4 participants and the latter interview used a participant translator. Consistent with the literature on qualitative research, the results from the individual and group interviews were very similar (Morgan, 1996; Stokes & Bergin, 2006). The individual interviews, however, elicited more detail, while in the group interviews the group process resulted in participants agreeing and disagreeing with one another in a friendly manner. After the conference, the first author interviewed each of the 8 American scientists individually by telephone.

The interview protocol explored whether the participants thought that male and female scientists were treated differently in their departments; with probes on whether there were differences in publishing, salary, promotion, resources, teaching, treatment by colleagues, and leadership opportunities. The protocol also asked about how they balanced their work and home life. The interviews were each

transcribed and analyzed to identify text blocks that exemplified the emerging key themes. Notes taken during the workshop were also reviewed and coded. The text blocks for each theme were further reviewed to refine themes and to identify subthemes.

RESULTS

The North African women interviewed included chemists (3), physicists (7), engineers (2), and a biologist (1). With the exception of one woman who worked in a national laboratory, all the scientists worked in academia. They ranged from recent doctoral graduates to senior professors. The US scientists were all in academia. They were, with the exception of one assistant professor, all senior, accomplished scientists. Their fields were chemistry (4), physics (3) and engineering (1).

The gendered experiences of North African and American women scientists in the workplace and home were profoundly different. Themes, which are described in detail below, emerged in the following key areas: women's representation in their departments, equality in the workplace, women in leadership, relationships with colleagues, and balancing work and family.

Women's Representation

Consistent with the limited literature on women's representation in the academic sciences in North Africa, the North African participants reported that there were a higher proportion of women faculty in their departments compared to the reports from the US women. North African chemists, for example, reported that approximately one-third of the faculty in their departments were women. One American reported a similarly high ratio in her department, while the other American chemists reported that women made up only 1 out of 4 or 1 out of 5 faculty in their departments. While representation in the United States was not as good as in North Africa, the Americans reported that there has been a tremendous amount of progress in the last few decades. One chemist explained, "I got my PhD in 1978. It's changed dramatically since then. When I got my PhD, there were no women in any research department that I knew of in analytical chemistry. If you looked at the top 100 chemistry departments, I'm pretty sure there was not a single woman."

Women's representation in physics and engineering was reportedly lower than in chemistry according to both the North African and American participants, but again women were better represented in North Africa. There was a wide range in the percentage of women reported in North African physics and engineering departments, from 5% to over a third of the faculty. In the US, participants were in departments ranging from 1 woman out of 10 faculty, to 1 woman in 4 faculty.

Equality in the Workplace

The North African women uniformly reported being treated the same as men in the workplace in terms of salary and resources, teaching loads, and service. An Algerian physicist explained, "In Algeria we haven't this men/woman discrimination. It's the government that gives the salaries. It's the same salary for everybody."

Similarly a Moroccan physicist said, "At the level of salary, …we are treated the same, at the same level—equally." Several women did point out that in the private sector "this equality often does not exist".

When asked about other areas of equity, one Algerian chemist was representative in stating, "Everything's the same. There is a rule. You are researchers, so you have one conference and one workshop or training. If you want to take two conferences, you have no workshop." Another explained, "If there is a good decision, it's good for woman and man. If it's bad, it's bad for man and woman."

The North African women did report that women often progress to promotion at a slower rate than men. They explained that, unlike in the United States, research is not required for promotion of academic scientists. Research productivity does, however, influence the timing of promotion, and research active faculty can be promoted up to two years earlier than those who do not do research. A Moroccan physicist explained that there are three levels of professor: "A is the first, B the second, C the last. To pass from A to B, after six years, you are exceptional promotion, the seventh year, it is rapid promotion, eight years is normal, to go from A to B." She went on to explain that many women are not research active, and wait the two extra years for promotion, "They say, I will move—two years is not important." Once they are promoted, "The salary is the same. For people who do research or not."

In contrast, many of the American women (6 of 8) reported subtle differences between how men and women were treated in their academic departments, but there was unanimous sentiment that things were much better than they had been several decades earlier. One scientist explained, "When I was in graduate school, women weren't taken very seriously. No one thought I would go on, so no one bothered with me." Another said:

> "We used to be treated very differently. I would say, my frustration was, you're supposed to be creative when you're a professor, your own unique ideas. Because I was the only one, every time I had a unique idea, people would view it as a woman's idea."

The main gender difference that American women reported in their departments was the need to "push" to get the same salary and resources that men received. One physicist explained,

> "I was teaching two classes. I use a new technique and I should have had an undergrad to assist me. I wasn't offered the undergrad, but it was given to a male faculty. I asked the chair about it, because I didn't know this resource was available and it was never offered to me, and he just said, 'I didn't know'. We always have to push and ask, the guys just have it more easily."

Another physicist explained, "Compared to the other guys that are the same level, my salary was actually low. Then I started to bitch about it, and got a salary bump. When I was threatening to leave, I got another bump." A chemist described, "I was

constantly going back to the contract we had… I was thankful I had insisted that everything be written down."

Several of the Americans also described having lingering questions about whether career setbacks or challenges may be due to gender. "You never know. You perceive something as being irrational, but you can't tell. It doesn't come with a label that says, 'because you're a woman'," a chemist explained. A physicist described not knowing if the lack of respect she received from a colleague in the same subfield was due to gender. She explained:

> "There's not room on the planet for someone to be doing what he's doing. Since that's what I'm doing, he doesn't take me seriously. I don't think he ever believed my results that made my name for myself. It's not controversial, it has 1,200 citations. Maybe I can't blame being a woman on all this."

A woman who had trained in both North Africa and the United States described what she saw as a fundamental difference in expectations about women scientists in the two parts of the world. In North Africa, she described, "It's even more expected that women are doing better. They're more studious, more serious, better achievers than men." In the US, her experience has been that, "The assumption is women cannot do it. I had to prove myself here. In science I always have to prove myself here." Another physicist corroborated this need to prove herself:

> "Students are a bit inherently more reluctant to accept a woman as being an authority figure in science, than a man. I had a few comments from people to that effect. One time I got a card from a student thanking me for teaching this course, a woman—she said something like, 'we wondered a bit at the beginning whether you'd be able to do that, but you took care of that in short order.' "

American women did report having higher service loads within the department than men, because, "There's not so many women, yet they want gender representation on all these committees." Some women described this as a burden because of the time away from research: "I have served on more search committees in the 15 years I've been here, and no men for sure have served on as many." However, several mentioned that at the national service level, having women disproportionately represented has helped propel their career. One chemist explained, "To be asked to be on these important committees gave me visibility early on. I don't think that would have arisen if I were male. It was a huge advantage for me in those early years."

Women in Leadership

While only one woman in each region reported currently having a women department chair, there was a substantial difference in the way the North African and US women characterized the likelihood of women entering leadership roles. North African women reported that having a woman in leadership was relatively unusual, in part because in most chairs are elected by the faculty in the

department. While women are better represented in North African science faculty than in the United States, they still are the minority. One Tunisian physicist explained, "As the head of the department we had only one woman. It's always been like this, leadership is reserved to men. Only one woman. I don't know how she managed to do this."

When asked why women are not in leadership roles, three key reasons were raised by the North African respondents. The most common reason cited was male opposition to women in leadership roles. Moroccan physicist explained:

> "Men generally are the main handicap for women's motivation, because they don't like if a woman is in a position of responsibility, so they won't help her. It's the opposite; they will try to not help her to succeed."
> When asked whether male colleagues explicitly express their lack of support for women in leadership, a Moroccan engineer explained:
> "They don't say it explicitly, but they were saying, it would be very difficult for her to run this department. It takes time, it's very rough, with steering committees, and struggling for the interest of your department against the other departments who have more power or more weight. It will be difficult for her. We need someone who is more aggressive rather than a woman." A

The second reason, also raised frequently, was that women do not feel they can take on a role that is so time consuming because of competing family responsibilities. One Moroccan physicist said, "They [women] don't apply for these [positions], because they know… it will take a lot of time and they can't do this." Another Moroccan scientist explained that women are "not very interested in those positions, for their family and personal constraints and responsibilities." A Moroccan chemist explained that there had been a woman leader in her department for a very short time, "Two years ago, we had a woman as the head of the department, but only for two months. [She] said it is too hard, and I am too tired. Before, we had only a man, and we have a man."

Finally, several North African women questioned the value of being the chair of a department. An Algerian physicist explained, "For me, it isn't something with which I want. I don't want to, I want to do research, yes. I want to be like, I don't know, to have Nobel prizes, okay, but head, no. It isn't my vocation."

Notably, several North African scientists expressed frustration with the challenges women face rising into leadership roles. A Moroccan engineer explained why she thought women should be in leadership roles:

> "Why should it always be a man? Plus, it's a question of networking, of relationships, so I think a woman would be more sensitive to women's problems, and she will be more serious. …In this kinds of positions you don't consider only work, but work and social things. So, she can compromise, she can make work a better place for woman, than a man could."

For the American scientists, while only one currently held a chair and one had been a chair in the past, several had postponed the opportunity to serve as chair, and a number had served under a woman chair in the past as well as working with very senior women administrators. In contrast to the North African women, having women in leadership seemed inevitable to most, if not all, of the American scientists as the number of senior women in their departments grew. For example, an engineer said, "I don't think there has ever been a woman chair or a woman dean at our school. I'm sure that will change at some point. For example, I'm sure at some point I'll have to serve as department chair." Others said, "It's going to be inevitable," and, "I'm going to do it when the time comes." When the chemist who had previously served as chair was asked if it felt to her like she was breaking a glass ceiling, her response was, "I didn't really think about it very much. I just put my head down and went to work. People would comment on it. I was too busy."

Interestingly, while most felt that leadership roles were achievable, several Americans reported, similar to some North African women, that they did not want to serve as chair because of the trade-off with research. "I've resisted department head because I love doing research," said a chemist. Another explained her hesitation, "Because it seems to me, once you choose that route, it's hard to go back [to research]."

Relationships with Colleagues

The North African women uniformly reported having poor relationships with their female colleagues, while the American women described searching out other women scientists for support. An Algerian physicist explained,

> "There is jealousy between women. I think in all Algeria, in my country, there is big jealousy, woman don't like woman, don't support woman, never, never….I have a lot of man friends, zero woman friends. Colleagues yes, friends no."

A Moroccan chemist echoed this sentiment saying, "It's a big problem. Not only in my university, but all society." She continued, "I don't know why with women, we can talk about family, your mom, but very little about work. I don't know. I think it's jealousy." In fact, an Algerian physicist described being skeptical that a scientific workshop only for women would be a supportive environment: "When [I received] the invitation, I thought, woman will support each other? I don't think so. But…because there is USA women, there's another mentality, not the [Algerian] culture."

Most of the North African women described having stronger friendships, better work relationships, and more support from male colleagues. A Moroccan engineer explained:

> "I feel that men build up stronger friendships than women. I feel that at work, I have a stronger relationship with a man than with a female. It's not that bad, actually, but it's stronger. More loyalty, more loyal to each other. If a man said to a man, you're my friend so will you vote for me, he will. If a woman said to a woman, you're not sure if she's going to really vote for you."

An Algerian chemist gave an example of the difference in support from her senior male and female colleagues. At a conference, where she wanted to introduce herself to a well-regarded scientist in her field, a male senior colleague encouraged her to introduce herself while a senior female colleague dissuaded her, "He pushed me, 'go, talk to him!' I said, 'No, he is a professor, I am only student'. He said, 'Go, go.' " In contrast, she reported that the woman colleague, "[She] tells me, 'no, he will never listen to your work.' " After taking her male colleague's advice, she ended up with a very productive collaboration with the scientist she reached out to.

Despite the positive relationships with male colleagues, several Moroccan scientists reported not being involved in important meetings that took place in cafes, which have almost exclusively male patrons. A physicist from Morocco explained, "Men, before faculty meeting, they go for coffee and discuss when there is a vote. When there is some meeting, they organize between them, with the decision. We don't have the opportunity to go with them." Another problem raised by the North African respondents was experiencing sexual harassment from men in their department. A Moroccan engineer described men asking, "about having an affair, or having something outside, a questionable relationship, I call it harassment. It's not necessarily in an aggressive way." She went on to say the men did not have power, it was only a few times, and, "It has never caused me any problem in my professional career." An Algerian scientist described, "I have always this problem, when I talk with men, they are always, even if I'm married, they look me… I don't know the word." When asked if they looked at her in inappropriate ways she said, "Yeah. This is my problem, a big problem."

The American scientists, in contrast, described valuing relationships with women scientists. Several described seeking out other women in their field: "I feel like we all seek each other out at conferences and interact" and "It's very, very, very important to keep your girlfriends. " A chemist described meeting with women in the department every six weeks, "[To] talk about what's going on in the department, just the women." She described helping younger female colleagues who "always want to be the good citizen and volunteer and help out" make sure that she "sees the bigger picture… and be a little more selfish with her time." Another chemist explained, "I always believe that the women are smart and honest, and won't screw you. I'm surprised when I come upon a woman that is completely unpredictable—in a negative way."

Several senior women, described a phenomenon they referred to as "jealousy discrimination," in which men in their department who had been supportive of them stop supporting them as they became more successful. A physicist explained:

> "One thing I noticed, [and] I thought I was crazy until I started talking with some of the other women I knew, and it's a common thing. When you're young and upcoming, everyone's positive and supportive. When you become part of the competition, you start being ignored. No one thinks of you, while before they wanted you on every single committee. I had to give all the talks before. All of a sudden, I'm not asked."

A chemist described, "Jealousy discrimination…sets in once you start to throw harder or run faster than the men." "It feels like punishment," she explained. One example she described was a department head assigning her to teach at 8am when her children were young, and refusing to change the time because "we're not going to give you anything special."

Balancing Household and Work Responsibilities

While the North African women reported gender equity in the workplace, they did not report equity in the home. Consistently North African women described the household as "the work of the woman, not of the man." A Moroccan chemist described the cultural norms:

> "A man comes to his house, he will relax, no housework. The house is the complete responsibility of the woman. So a woman, after work, she has to work again inside her house. A man will relax. This is the culture."

A young woman who described her husband as very progressive (willing to consider temporarily moving to Asia for her job), for instance, did not cook at all. She was pleased that her husband would "not ask me to do something which takes hours [to cook]." A Moroccan engineer expressed her frustration at this cultural expectation, "That's what I find hard here, this perception that housework is only the specialty of women, and you have to deal with it no matter what your profession is. This is the hardest part, the core problem here."

Since research is not mandatory for promotion for North African scientists, some women at the workshop reported stopping their research when their children were young. A Moroccan engineer explained, "It's simple…It took me five years of my life to make children, and during these five years, I didn't do any research." A Tunisian physicist anticipated slowing her career once she had a baby:

> "So for two or three years, we ..men and women [are] doing the same thing. I have to make the baby now, I would go a step down, he can keep going. For a couple of years, stop doing my career. Then [I] can just accelerate."

Some mentioned that women professors were less likely to do research in general because of family responsibilities. A Moroccan chemist explained, "Most woman in my department don't do research, little research… they haven't enough time to do that because they have their family." When asked whether women not being as engaged in research influenced attitudes about hiring women, the response was that it did not.

A number of women reported making "concessions" to balance their work life and home life. A physicist with one child explained, "I've chosen to not have more children. It's my choice… I know, because with another child, I cannot do research. It's impossible." Another, whose husband is also an academic, said that she had more constraints because of her family responsibilities. She explained that she had "sacrificed to let him progress." Others who were not married reported it to be a challenge to find a man who would accept their commitment to their careers. A Moroccan chemist explained:

> "But if he sees that you are working all the time? He asks you, 'Where are you?' 'I am to the faculty [university].' 'Where are you?' 'I am working on my computer.' He says, 'When will she cook? When will she take care of her house? She hasn't time for me.' "

While all the women attending the workshop had the freedom to be at the event, several pointed out that not all their female colleagues were as fortunate. One Moroccan scientist said that she had women colleagues who were suffering: "Their husbands won't let them go far in their career because they cannot spend too much time [at the university], their hours are really counted, after work [they] have to come back quickly. They cannot really travel." A Moroccan chemist explained that she could not have spent the three days at the workshop if she did not go home each night:

> "I could not be here with you for 3 days and let the husband be at home alone. Imagine, if his mother came, she would say, 'you are the woman and he's the man.… It's not normal, that the woman leave the house to participate in workshops, or to travel to another country.' "

The American women, in stark contrast to the North African women, reported sharing home responsibilities quasi-equally with their husbands, in most cases. A physicist explained:

> "We have carved out time equally. When the children were young, we traded off time. I would take an afternoon and he would have another afternoon, we just did everything more or less at the same level…I was able to be in my office, if it was his day to worry about the baby, I didn't. When it was his day to pick the kids up at school, I didn't."

The arrangement was not always exactly even, particularly in a case of a woman who remarried so her husband was her children's stepfather and her children wanted her attention. There was, however, one chemist who described her husband doing "the lion's share of the day to day kid raising, especially in the adolescent and teenage years." Another chemist described dividing up the household responsibilities and taking on the cleaning and laundry while her husband was in charge of shopping and cooking. The arrangement worked very well for her, as she explained, "I hired a housekeeper!"

Despite sharing household responsibilities with their husbands, most American women scientists reported that there was never quite enough time for work and family. An engineer explained, "You're always making compromises between time with family and time with work. I feel like I've never had enough time for either." A physicist added, "You're always feeling guilty about not doing this job enough and that job enough." Many, though, acknowledged that the flexibility of working in the university environment makes the balance feasible:

> "The university makes it an easy place to balance career and family. We have a lot of time flexibility. I did a ton of my work late at night for many

> years. If one of my kids had something, I didn't have to tell anybody I was leaving and make up the work later."

DISCUSSION

This exploration of how North African and American women scientists experience gender in the workplace and at home suggests that their experiences are almost polar opposites. While North African women report better representation of women in the sciences and equity in terms of salary and resources, they reported less support for women in leadership roles and are almost exclusively responsible for all housework. The disproportionate share of household responsibilities, coupled with less priority on research within universities, seems to result in women being less likely to engage in research, particularly when their children are young. It also seems to be related to women's reluctance to take on leadership roles in academia.

In contrast, many but not all of the American women felt they had to "push" to get to equality in the workplace, but they felt that leadership roles were within reach. Women colleagues provided the American scientists with important supports, in contrast to relationships between women in North Africa, where women reported a low level of trust among women colleagues. At home, American women reported something approximating an equal partnership in terms of home and childcare responsibilities, which they viewed as enabling their professional success.

Both the North Africans and Americans noted that the North African women had gender equity in the workplace, but that did not necessarily translate to ideal working conditions. An American chemist explained:

> "Hearing how little access they had to high-end equipment that we take for granted was sort of a reality check. They would say something like, 'once when I was a post-doc I had access to that piece of equipment.' That we use every day and take for granted, they remember once having access to that."

A number of American women reported concern over how North African women had such a large responsibility in the home, because from the Americans' perspectives working from home and sharing the household responsibilities were crucial to their professional success. Several thought that the home responsibilities described by the North Africans was similar to "my mother's generation" or what "our grandmothers would have" had, which was "a reminder of how lucky we are." An American explained:

> "On the face of it, one would say that they have lots of opportunities, might even use equality. But when you start digging in, my impression is it's not the same as what I have. I don't perceive that they have real supportive husbands. I sensed a lot of stress on their part with having to juggle everything."

Without equality at home, this American scientist did not think it was possible for North African women to benefit from the equality in the workplace.

There were two areas where there were similarities across all the women scientists. In both North Africa and the US, women reported that universities provided a very flexible work environment for balancing work and family responsibilities. Also a number of women from both regions described not being interested in pursuing leadership roles within academia because of their commitment to research.

Limitations

This study should be interpreted in light of its limitations. Foremost is that the number of women scientist participants from North Africa and the United States was limited and all study participants were attendees at the collaborative workshop. The North African women pointed out that there were women who would not be allowed to attend a workshop lasting several days whilst being away from their families. While those interviewed from North Africa may not be representative, they did report very consistent experiences even across the three countries. Similarly, the American women may not have been representative, since all but one of the participants were very senior, accomplished scientists. Another key limitation was that the interviews were all conducted in English, which was most of the North African women's third language, after Arabic and French. This may have resulted in a lack of clarity in conveying some concepts, and certainly the women's quotes sound less articulate than they, in fact, were. Future research should be conducted with larger, more representative samples, by bilingual investigators.

CONCLUSION

In conjunction with a research partnership workshop for women scientists from Morocco, Tunisia, Algeria, and the United States, we conducted exploratory research to better understand women's experiences with gender in the workplace and at home. This research suggests that culture and norms in the two regions resulted in women experiencing gender in very different ways. In North Africa, the women described having gender equity in the work place in terms of salary and resources, but women were almost entirely responsible for child and home care. In the United States, most women reported having to "push" to ensure gender equity in the workplace, but they had close to equal partnerships at home. Women from both regions highlighted the importance of equity in both the workplace and home for women to reach their full professional potential. There is clearly work still to be done in both regions to accomplish this goal.

REFERENCES

Al-Rasheed, M., Benjelloun, S., El-Sayyid, M., Khadduri, W., Korany, B., Khadija, M., … Sayigh, Y. (2009). Arab Human Development Report 2009. *UNDP*. Retrieved September 16, 2014, from http://www.arab-hdr.org/contents/index.aspx?rid=5

Berrah, N. (2006). Women in science and their role to advance the societies from the south. In P. Faugeras, A. Hoummada, R. Klapisch (Eds), *Sharing Knowledge Across the Mediterranean Area: Towards a Partnership for Sustainable Management of Resources and the Prevention of Catastrophes* (p. 43-46) Amsterdam, Netherlands. IOS Press.

Bilimoria, D., Joy, S., & Liang, X. (2008). Breaking barriers and creating inclusiveness: Lessons of organizational transformation to advance women faculty

in academic science and engineering. *Human Resource Management*, *47*(3), 423–441. doi:10.1002/hrm.20225

Cheikh, M. (2010). *Women's and Girls' Participation in Science and Technology in North Africa*. Expert paper presented to the United Nations Division for the Advancement of Women. Paris, France. Retrieved from: http://www.un.org/womenwatch/daw/egm/gst_2010/Cheikh-EP.9-EGM-ST.pdf.

De Welde, K., & Laursen, S. (n.d.). The Glass Obstacle Course: Informal and Formal Barriers For Women Ph.D. Students in STEM Fields. *International Journal of Gender, Science and Technology*. Retrieved from http://genderandset.open.ac.uk/index.php/genderandset/article/view/205

Hassan, F. (2000). Essays on Science and Society: Islamic Women in Science. *Science*, *290*(5489), 55–56. doi:10.1126/science.290.5489.55

Martin, M. O., Mullis, I. V. S., Foy, P., & Stanco, G. M. (2012). *TIMSS 2011 International Results in Science*. *(2012). TIMSS & PIRLS International Study Center, Boston College.* Chestnut Hill, MA. Retrieved from http://timss.bc.edu/timss2011/international-results-science.html

Megahed, N., & Lack, S. (2011). Colonial legacy, women's rights and gender-educational inequality in the Arab World with particular reference to Egypt and Tunisia. *International Review of Education*, *57*(3), 397–418. doi:10.1007/s11159-011-9215-y

Morgan, D. L. (1996). Focus Groups. *Annual Review of Sociology*, *22*(1), 129–152. doi:10.1146/annurev.soc.22.1.129

National Science Board. (2014). *Science and Engineering Indicators 2014*. Arlington, VA. National Science Foundation. Retrieved from http://www.nsf.gov/statistics/seind14/index.cfm/overview

Rees, T. (2001). Mainstreaming Gender Equality in Science in the European Union: The "ETAN Report." *Gender and Education*, *13*(3), 243–260. doi:10.1080/09540250120063544

Segal, A. (1996). Why Does the Muslim World Lag in Science? *Middle East Quarterly*. Retrieved from http://www.meforum.org/306/why-does-the-muslim-world-lag-in-science

Sikora, J., & Pokropek, A. (2012). Gender segregation of adolescent science career plans in 50 countries. *Science Education*, *96*(2), 234–264. doi:10.1002/sce.20479

Stockard, J., Greene, J., Lewis, P., & Richmond, G. (2008). Promoting Gender Equity in Academic Departments: A Study of Department Heads in Top-Ranked Chemistry Departments. *The Journal of Women and Minorities in Science and Engineering*, *14*, 1–27.

Stokes, D., & Bergin, R. (2006). Methodology or "methodolatry"? An evaluation of focus groups and depth interviews. *Qualitative Market Research: An International Journal*, *9*(1), 26–37. doi:10.1108/13522750610640530

Tiliouine, H. (2014). Gender dimensions of quality of life in Algeria. In E. Eckermann (Ed.), *Gender, Lifespan and Quality of Life* (Vol. 53). Dordrecht:

Springer Netherlands. doi:10.1007/978-94-007-7829-0

UNESCO. (2014). Science, Technology and Innovation. *Institute for Statistics*. Retrieved from http://www.uis.unesco.org/DataCentre/Pages/BrowseScience.aspx

United Nations. (2014). Gender Parity Index in tertiary level enrolment. *Millenium Development Goals*. Retrieved from http://unstats.un.org/unsd/mdg/SeriesDetail.aspx?srid=614