



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL PROJECT

WOMEN RETENTION: THE USE OF EGG FREEZING AND IN VITRO FERTILIZATION (EF/IVF) AS A RETENTION TOOL FOR COMPETITIVE FEMALE NAVAL OFFICERS

March 2019

**By: Jennifer Charlton
Sephora Fortune**

**Advisor: Robert J. Eger
Co-Advisor: Kathryn J. Aten**

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2019	3. REPORT TYPE AND DATES COVERED MBA Professional Project	
4. TITLE AND SUBTITLE WOMEN RETENTION: THE USE OF EGG FREEZING AND IN VITRO FERTILIZATION (EF/IVF) AS A RETENTION TOOL FOR COMPETITIVE FEMALE NAVAL OFFICERS			5. FUNDING NUMBERS	
6. AUTHOR(S) Jennifer Charlton and Sephora Fortune				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) The 2016 Navy Pregnancy and Parenthood Survey conducted by Naval Air Warfare Center Training Systems Division (NAWCTSD) cited that the primary retention influencer for female naval officers is the "ability to have a family." This project is a policy proposal that targets the primary reason female naval officers are leaving the military. The researchers assessed the viability of implementing EF/IVF (egg freezing and in vitro fertilization) as a retention tool for competitive female naval officers in the unrestricted line (URL) communities. The researchers proposed an EF/IVF pilot program that was analyzed from the ethical and financial perspectives. The ethical perspective justified why the policy proposal should be implemented on the basis of equality, equity, and need. The financial perspective supported the ethical perspective by estimating an overall average program price to implement the proposed EF/IVF pilot program.				
14. SUBJECT TERMS retention of women, freezing eggs, in vitro fertilization, Navy, competitive, retention tool, incentive, equality, equity, distributive justice, hard-charging talent, activity-based costing, pilot program, female naval officers,			15. NUMBER OF PAGES 87	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

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FERTILIZATION (EF/IVF) AS A RETENTION TOOL FOR COMPETITIVE
FEMALE NAVAL OFFICERS**

Jennifer Charlton, Lieutenant Commander, United States Navy
Sephora Fortune, Lieutenant, United States Navy

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
March 2019**

Approved by: Robert J. Eger
Advisor

Kathryn J. Aten
Co-Advisor

Don E. Summers
Academic Associate, Graduate School of Business and Public Policy

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ABSTRACT

The 2016 Navy Pregnancy and Parenthood Survey conducted by Naval Air Warfare Center Training Systems Division (NAWCTSD) cited that the primary retention influencer for female naval officers is the “ability to have a family.” This project is a policy proposal that targets the primary reason female naval officers are leaving the military. The researchers assessed the viability of implementing EF/IVF (egg freezing and in vitro fertilization) as a retention tool for competitive female naval officers in the unrestricted line (URL) communities. The researchers proposed an EF/IVF pilot program that was analyzed from the ethical and financial perspectives. The ethical perspective justified why the policy proposal should be implemented on the basis of equality, equity, and need. The financial perspective supported the ethical perspective by estimating an overall average program price to implement the proposed EF/IVF pilot program.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABC	activity-based costing
AD	active duty
APP	average program price
APR	average program rate
ART	assisted reproductive technology
BAMC	Brooke Army Medical Center
BRS	Blended Retirement System
CDC	Centers for Disease Control and Prevention
CIP	Career Intermission Program
CNA	Center for Naval Analyses
CNO	Chief of Naval Operation
DHRB	Department Head Retention Bonus
DoD	Department of Defense
DoN	Department of the Navy
EF/IVF	egg freezing and in vitro fertilization
EO	equal opportunity
EOD	Explosive Ordinance Disposal
FET	frozen embryo transfer
FY19	fiscal year 2019
GIFT	gamete intrafallopian transfer
ICSI	intracytoplasmic sperm injection
IUI	intrauterine insemination, also called artificial insemination
j.g.	junior grade
JCS	Joint Chiefs of Staff
LCDR	Lieutenant Commander

MAMC	Madigan Army Medical Center
MILPERS	Military Personnel
MILPERSMAN	Military Personnel Manual
MSR	minimum service requirement
MTF	military treatment facility
NAVADMIN	Naval Administration
NAWCTSD	Naval Air Warfare Center Training Systems Division
NMCSD	Naval Medical Center San Diego
NPC	Navy Personnel Command
OAPP	overall average program
OPNAVINST	Operation Naval Instruction
PRT	physical readiness test
Q	number of program participants
RAND	Research and Development
ret	retired
SEAL	sea, air, and land
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
Subs	Submariners
SWAN	Service Women Action Network
SWO	Surface Warfare Officer
TAMC	Tripler Army Medical Center
TSP	Thrift Savings Plan
UCLA	University of California
URL	Unrestricted Line
USS	United States Ship
WAMC	Womack Army Medical Center
WAVES	Women Accepted for Voluntary Emergency Service

WRNMMC	Walter Reed National Military Medical Center
WWI	World War One
WWII	World War Two
ZIFT	zygote intrafallopian transfer

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ACKNOWLEDGMENTS

First, we would like to give honor to God, our Lord and Savior Jesus Christ, who gave us the knowledge, strength, and endurance to write this thesis.

To Lieutenant Commander Adrain Felder, your own hard work and dedication in publishing your thesis, “Fertility Assistance for Female Naval Officers: The Emotional, Physical, and Monetary Cost,” deeply inspired and encouraged us to carry the torch of proposing the use of egg freezing and in vitro fertilization into further naval policies.

To our thesis advisors, Dr. Robert Eger and Dr. Kathryn Aten, there are no proper words to convey our deep gratitude and respect for your leadership while guiding us throughout the compilation of our thesis policy proposal.

To the incredible Naval Postgraduate School (NPS) individuals that collaborated with us, we greatly appreciate all of your expertise, wisdom, and insight: Graduate Writing Center staff member Dr. Cheryldee Huddleston, Thesis Processing Office staff members Michele D’Ambrosio and Rebecca Pieken, and the Graduate School of Business and Public Policy’s Dr. Tom Albright and Major Pyojeong Kim.

To our external research point of contacts who provided us with continuous subject matter expertise, data, and references, we are particularly grateful for your assistance: Dr. Jessica Milam, LT Caroline Brown, LCDR Desmond Walker, LCDR Mabi Morgan, and LCDR Lori Chestang.

To the beloved Charlton and Fortune family, friends, and Monterey Church for providing continuous prayers and encouragement, we could not have it done without you.

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I. INTRODUCTION

A. OVERVIEW

1. Need for Talent

The U.S. military must effectively deter, deny, and defeat its adversaries (Joint Chiefs of Staff [JCS], 2015). Warfighters are the most critical assets of the military. The 2018 National Defense Strategy stated that for the Department of Defense (DoD) to be effective in its mission, it needs to build a more lethal force (DoD, 2018). To protect the country and win the nation's wars, the U.S. military needs the best combination of people, equipment, and technology (JCS, 2015). Our warfighting capabilities are only as good as the men and women who make it all work. Therefore, the U.S. military must recruit and retain the most competent and capable people.

2. Loss of Talented Women

The Navy is losing its seasoned female officers. Navy demographics data trends from 2006 to 2016 show that the total female population in the Navy is rising, within both the officer and enlisted ranks; however, the O-4 to O-6 female officer subgroup population has been declining since 2014 (DoD, 2016). According to the Navy's *2016 Pregnancy and Parenthood Survey*, the primary influencers for leaving the Navy relate to family concerns and unpredictability for both men and women (Naval Air Warfare Center Training Systems Division [NAWCTSD], 2016). More specifically, the top influencer for female officers leaving is the ability to have a family. The subsequent *2018 Navy Personal and Professional Choices Survey Summary* states that "women and men indicate similar key influencers in their decision to stay in or leave the Navy compared to the 2014 and 2016 surveys" (Office of Talent Optimization, 2018). This suggests that current retention strategies are insufficient at retaining female officers because they do not adequately address officers' concerns about the ability to have a family.

ENLISTED		OFFICER	
Women	Men	Women	Men
TOP THREE INFLUENCERS TO STAY			
Job Security/Stability	Loyalty to Nation/Service	Job Security/Stability	Loyalty to Nation/Service
Benefits/Pay	Job Security/Stability	Benefits/Pay	Job Security/Stability
Loyalty to Nation/Service	Retirement	Loyalty to Nation/Service	Retirement
TOP THREE INFLUENCERS TO LEAVE			
Impact of career on ability to have a family	Impact of career on spouse/family	Impact of career on ability to have a family	Impact of career on spouse/family
Impact of career on spouse/family	Predictable Schedule	Impact of career on spouse/family	Predictable Schedule
Predictable Schedule	Work/Life Balance	Predictable Schedule	Work/Life Balance

■ Job Security/Financial Incentives
■ Loyalty to Nation/Service
 ■ Impact of Career on Family
■ Impact of Career on Personal Life

Figure 1. Top Three Retention Influencers for Female Naval Officers.
Source: Department of the Navy (2016).

3. Need for Research

The United States has an all-voluntary military focused on building the force for the future. This force includes the free choice of men and women. Although the Navy is doing well at recruiting women, a drop in retention at the seasoned officer paygrade level of O-4 to O-6 has been discovered. These seasoned and experienced officers are needed not only to lead at the tactical level, but at the operational and strategic level to plan and advise our nation's policy decision-makers. Therefore, this retention drop must be reversed. One way to address this retention drop is by focusing on the primary influencer for why female officers are leaving the Navy, which is the *ability to have a family* as shown in Figure 1 (NAWCTSD, 2016).

The ability to have a family includes planning, starting, and supporting a family. While planning and supporting a family may be more controllable factors, starting a family biologically poses the greatest challenge to naval servicewomen's desires for a family. Naval Postgraduate School (NPS) graduate LCDR Adrain Felder documented the infertility challenges for many female naval officers based on a survey in her thesis,

Fertility Assistance for Female Naval Officers: The Emotional, Physical, and Monetary Cost:

Many of the participants experienced barriers to pregnancy related to medical concerns, partner-related issues, and the inability to conceive for unknown reasons. Participants' commitment to the Navy and time limits imposed by biological clocks, shore duty, permanent change of station, required trainings and deployments exacerbated the barriers to pregnancy they faced and added to the emotional, professional, physical, and monetary costs they experienced. Participants often postponed pregnancy to fulfill their Navy commitments and avoid actions associated with stigmas surrounding pregnancy in Navy culture. (Felder, 2018, p. 145–146)

To justify the need for research, consider the challenges of stressful deployments, dual military marriages, and short shore rotations in addition to a woman's ability to plan a family. Deployments are known to be a stressful tempo regardless of the mission. Upon return from deployment, it may take both men and women several months to acclimate to a more placid way of life. There is a level of difficulty associated with reproduction when a woman's stress levels are high, as explained by Nepomnaschy, Sheiner, Mastorakos, and Arck (2007).

In dual military marriages, one of the spouses may be forward deployed while the other spouse is fulfilling a shore duty assignment. For a female, shore duty is the approved time to start a family, but this period may not align with the opportunity for starting a family. Lastly, short shore rotations, typically two years or less, may not provide a woman enough time to reduce her stress levels, find a committed partner, complete a successful pregnancy, start a family, and return to a sea-going assignment. Indubitably, research on women retention loss due to family-starting is needed, considering men are less likely required to consider these challenges as they initiate family planning.

In 2014, almost 40% of active duty servicewomen reported facing fertility complications in the *Access to Reproductive Health Care: The Experiences of Military Women* survey conducted by the Service Women Action Network (SWAN) (Kime, 2018, para. 2). The DoD has sponsored RAND Corporation to conduct a study on military women's health, with findings expected to be released in mid to late 2019 (Jowers, 2018, para. 5). Jowers (2018) stated that, "According to Sarah Meadows, a senior sociologist

with RAND Corporation, ‘There hasn’t been a DoD-wide sponsored women’s health survey since 1989’” (para. 5). With rising infertility rates in the national population, it is expected that military women are also experiencing this effect. Therefore, research on the potential use of egg freezing and in vitro fertilization (EF/IVF) as a retention tool for competitive female naval officers can be valuable for the U.S. Navy.

EF/IVF technological advances, societal changes and expectations regarding EF/IVF, and industries’ utilization of fertility assistance has increased and made EF/IVF a viable option and rising medical necessity. Top civilian companies have begun to offer benefit packages that include EF/IVF to recruit and retain women. This option can also be an effective retention tool in the Navy since it offers competitive, hard-charging, career-pursuing servicewomen the flexibility to plan for a family at a feasible time in life, the opportunity to start a family if fertility assistance is needed, and financial security in planning a pregnancy through fertility assistance.

B. RESEARCH OBJECTIVE

The purpose of this research is to assess the viability of providing egg freezing and in vitro fertilization (EF/IVF) as an additional retention tool for competitive female naval officers.

C. RESEARCH APPROACH

The approach used in this research consists of exploring the EF/IVF tool using two theoretical frameworks: ethical and financial. The ethical framework aids in justifying the basis for implementing a recommended retention tool. This study adopts the three ethical perspectives outlined by Morton Deutsch (1975): equality, equity, and need. The financial framework aids in assessing the cost of implementing this retention tool. This study uses cost principles outlined by Brewer, Garrison, and Noreen (2015) to determine an average program price for a proposed EF/IVF pilot program. For the purposes of this research, the following naval groups will be defined as follows:

- *Junior female officers*: O-1 to O-3 paygrade female naval officers
- *Seasoned female officers*: O-4 to O-6 paygrade female naval officers

- *Competitive female officers*: Female naval officers who have screened for their most current community milestone within the five unrestricted line (URL) communities: Surface Warfare (SWO), Nuclear (Surface and Submarine) Warfare, Aviation, Explosive Ordnance Disposal (EOD), and Naval Special Warfare.

D. ORGANIZATION OF RESEARCH

The remainder of this research is organized as follows:

Chapter II provides the research background, including women's history and contributions to the Navy, recruiting and retaining female officers, current retention strategies and shortcomings, and a justification for exploring EF/IVF as a viable retention tool. Chapter III incorporates the theoretical framework and methods utilized in this study. This includes the underlying ethical and financial theories of this research and an explanation of how the cost estimation for an EF/IVF pilot program can be conducted. Chapter IV explores the implementation of an EF/IVF pilot program by analyzing data and evidence in the Navy using the ethical and financial theoretical frameworks and methods. Finally, Chapter V summarizes the study, offers recommendations for decision-makers based on the analysis, and outlines needed future research.

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II. BACKGROUND

A. HISTORY OF WOMEN AND THEIR CONTRIBUTIONS TO THE NAVY

Throughout the course of naval history, when opportunities granted women the ability to serve, they did so with excellence. Women have filled warfighting gaps, ranging from spies during the Revolutionary War to serving as submarine nuclear officers leading submarines during recent years. During earlier naval voyages, women served as cooks and tailors, and even disguised themselves as men to perform other crew member roles. These women were often the wives and daughters of Sailors. Oftentimes during wartime, the need for “all hands on deck” arose. Eventually, Navy leadership requested that Congress open the doors for women to serve in the Navy (Godson, 2001, p. 43). Susan H. Godson (2001) explains in her book *Serving Proudly*:

As the Navy evolved and developed with the country, so did the role of women in the Navy. With the exception of female nurses who have always been considered essential to care for men in war, to train the enlisted medical corpsmen (male and female), and to set up and staff hospitals in various places, acceptance of women within the military has always been extremely sensitive to social and cultural values. (p. 58)

During the early 1900s, Congress paid attention to the contributions of women to assist and aid in the military. The huge impact of female nurses serving temporarily during wartime led to the awareness and demand for women nurses to serve in the military continuously. In 1901, Congress established the Army Nurse Corps, and in 1908, it established the Navy Nurse Corps in which the “Sacred Twenty” were the first women to officially serve in the Navy (Clark, 2016, para. 8).

World War One (WWI) created the need for a large number of women to join the U.S. Navy (Godson, 2001, p. 165). Men were needed for sea duty, so women were allowed to enlist and assigned to shore duties to relieve them. Godson (2001) explained that “once the war ended, all the women were eventually sent back to their civilian lives, while a small volunteer reserve force remained on inactive duty lest their services be needed again” (p. 173).

Prior to entering the next world war (WWII), Public Law 689 was signed by U.S. president Franklin D. Roosevelt in 1942. This law granted women to return to active duty from the volunteer service that was established from WWI. In addition, the law opened a wider range of Navy opportunities for women to serve as enlisted and officer. Naval History and Heritage Command chronicles this event from July 30, 1942, “the second large-scale enlistment came months before the United States entered World War II” (Naval Office of Information, 2018, para. 4). Women continued to serve and fill in the gap wherever authorized.

Toward the end of the Vietnam War, Congress disestablished the U.S. draft. In the absence of a requirement for males to serve, women proudly volunteered within all military branches of service. Following the draft, military job modernization and expansion enabled women to advance in officer designations and enlisted rates. Beginning in 1978, women began serving on non-combatant ships, including submarine tenders (*Washington Post*, 1994, para. 16). By 1993, women were integrated into the aviation community. However, they were not allowed to serve as fighter pilots due to controversy over whether fighter aircrafts should be manned by females. Nevertheless, in the following year, United States Ship (USS) *Eisenhower* became the first aircraft carrier to be integrated with women. Onboard, 500 female officers and Sailors filled sea-going billets and added to a crew size of 3,000 officers and crew. Shortly afterward, women were assigned to more ships, including other carriers, warships, and dock landing ships (*Washington Post*, 1994, para. 16).

By the early 2000s, the integration of women on ships became widespread through Navy fleets; however, submarines were still limited to men only. The cost estimated for integrating women onboard submarines was extremely high due to a need to expand close berthing quarters and bathroom facilities known as heads. However, increasing operational requirements and not enough men serving within an all-volunteer force led to the need to reassess this gender-based limitation. A more detailed plan had to be developed to fill this gap, and women were ready again to serve in a greater capacity.

On February 19, 2010, “Secretary of Defense Robert Gates formally presented a letter to congressional leaders notifying them of the Department of Navy’s desire to reverse

current policy of prohibiting submarine service to women” (Department of the Navy [DoN], 2010). Secretary of the Navy Ray Mabus reinforced this initiative with his statement of support: “There are extremely capable women in the Navy who have the talent and desire to succeed in the submarine force” (DoN, 2010). The SECNAV continues, “Enabling them to serve in the submarine community is best for the submarine force and our Navy. We literally could not run the Navy without women today” (DoN, 2010). By 2012, the first group of female officers began to serve on submarines, beginning with the Ohio Class submarines.

As of 2016, women have been authorized to enter the EOD (explosive ordnance) and the elite SEAL (sea, air, and land) training. Currently, all communities in the Navy are now open to both genders, removing the “male-only” environment from the Navy’s policies and culture. Although female recruits have not officially completed all SEAL training requirements, women are still applying and putting forth the effort to one day complete the fitness challenges that the assignment requires.

Throughout the first 50 years of naval rates opening to women, there have been many trailblazers worth mentioning:

Lieutenant (j.g.) Harriet Ida Pickens and Ensign Frances Wills:

Lieutenant (j.g.) Harriet Ida Pickens and Ensign Frances Wills were both commissioned as the first African-American WAVES (Women Accepted for Voluntary Emergency Service) officers in December 1944. They were members of the final graduating class of the Naval Reserve Midshipmen’s School (WR) at Northampton, Massachusetts (Naval History and Heritage Command, 2009, para. 8).

Captain Sue Dauser:

Also in 1944, Public Law 238 granted full military rank to members of the Navy Nurse Corps. Sue Dauser, the Director of the Navy Nurse Corps, received a full commission in the rank of Captain, thereby becoming the first female in that rank (Naval History and Heritage Command, 2009, para. 15).

Rear Admiral Grace Hopper:

Nicknamed due to her major contributions, “Amazing Grace,” known as the mother of computing, she helped to revolutionize the world of computers. Sworn into the reserve to serve in the WAVES, Hopper’s request to transfer to the regular Navy at the end of the war was declined due to her age (38) so she continued to serve in the Navy Reserve in which she retired in 1966 (DoN, 2019, para. 3).

Admiral Michelle Howard:

Admiral Michelle Howard was the 1st women in U.S. Naval History to achieve the rank of a four star flag officer, the highest rank in the military. In 1999, Howard became the first African-American woman to command a U.S. naval warship when she took the helm of the USS *Rushmore*. Howard planned the 2009 mission to rescue Capt. Richard Phillips from Somali pirates who had seized his cargo ship at the Gulf of Aden. The hijacking and rescue were later depicted in the 2013 Hollywood film “Captain Phillips.” She later served as the Vice Chief of Naval Operations, the 2nd highest position in the Navy. Two years later, President Barack Obama chose her to head Europe and Africa, making her the first female four-star admiral to command such operational forces. She retired December 2017 as a true trailblazer for all women with 35 years of service (Wyland, 2017, para. 7).

Over the last 110 years of naval history, women have fought for the ability to defend the United States of America (Wyland, 2017, para. 14). The Navy has taken several initiatives to open ranks and provide women the ability to serve in all capacities. However, it is important to note that women were only allowed to answer the call of duty during times of economic necessity and when there was a need to increase capacity beyond the available American male population. Now that the Navy and all armed forces have experienced the benefits of accepting women into the war fight, it is critical that they continue to recruit and retain top competitive female leaders.

B. RECRUITING AND RETAINING WOMEN

1. Need for More Diversity and Inclusion

Senior naval leaders have emphasized the benefits of expanding women’s roles in the Navy and the need to continue increasing female representation and inclusion. Over the past decade, the total female population in the Navy has risen among officers and enlisted

alike. As of 2018, women make up 19% of the officer population and 20% of the enlisted population (Navy Office of Information, 2018, para. 6). While this is a positive trend, the Navy's mission effectiveness can be enhanced by more female warfighters. Admiral Michelle Howard (Ret.), the first female four-star admiral in U.S. history, advocated that the Navy should strive to increase the number of women on every ship, squadron, and wardroom to 25% to obtain optimal workplace normalization and performance in the Navy (Olson, 2015, para. 6–7). Olson quoted Admiral Howard (Ret.) as stating the following:

Howard said women make up about 46 percent of the civilian workforce, and studies by the Department of Labor have found that an organization achieves optimal performance when its workforce maintains at least 25 percent of whatever the minority sex might be. Without that, there “are always accusations of tokenism” and “stereotyping,” she said. For that reason, Howard proposed to the secretary of Navy that the service “ought to be shooting for a Navy that’s about 25 percent women,” she said. At that level “workplace relationships get normalized,” she said. (Olson, 2015, ara. 6–7)

Current Chief of Naval Operations (CNO) Admiral John M. Richardson highlighted Admiral Howard's meritorious contributions to the Navy and re-emphasized the importance of the 25% goal at the 2018 Women in Defense Forum (Richardson, 2018). From the historical observation at the Naval Academy, 25% reflected a more natural shift in improved gender relations on the “yard” by normalizing the academic and work place environment. By increasing the number of women, women became better represented and less isolated throughout the varying levels of leadership, fostering a more diverse and inclusive environment.

Recognizing the value of 25% gender diversity, the Navy used this target when implementing its integration of women into the submarine community (Richardson, 2018). This translated into starting with two to three female officer accessions per submarine into the community. They became submarine-trained, highly qualified, tactical warfighters leading undersea forces and assets. Their outstanding performance led to the integration of all submarine platforms and to the addition of female enlisted Sailors joining the fight under sea (Richardson, 2018).

Not only has integrating women at the 25% target benefited the submarine community, but also the entire Navy since repealing gender barriers to job roles in the DoD (Richardson, 2018). At the 2018 forum, Admiral Richardson highlighted that a goal for diversity alone is insufficient. Yet Richardson noted that inclusion leads to a holistic warfighting approach by limiting the unconscious bias. This is accomplished by valuing and utilizing the various backgrounds, analytical approaches, and communication styles of other people. Ultimately, the Navy gains its competitive advantage as a diverse and inclusive team that works together to lead operations, establish global partnerships, and beat adversaries.

2. Effectively Recruiting Women

The Navy's total female population has grown significantly in recent years. From 2006 to 2016, the female officer population rose from approximately 7,500 to almost 9,700 (15.0% to 18.2%), and the female enlisted population rose from approximately 42,300 to slightly over 51,100 (14.4% to 18.9%) (DoD, 2016). This reflects an approximate 1:5 ratio for female officers to female enlisted and has remained fairly consistent over 10 years. This growth suggests that the Navy is effectively recruiting women overall.

3. Not Retaining Seasoned Women

While the Navy has been effective in recruiting women, further analysis into Navy demographics data shows that the Navy is losing its seasoned women officer population as shown in Figure 2, 3, and 4. The O-4 to O-6 paygrade female officer subgroup rose from 2,617 in 2006 and peaked at 2,870 in 2014, then declined to 2,747 by 2016 (DoD, 2016). Before its decline, it was adding women to this population group at an average of 13 women per year. On the other hand, between 2006 to 2016, the O-1 to O-3 paygrade female officer subgroup steadily rose almost every year, from 4,936 in 2006 to 6,925 in 2016, adding at an average rate of 199 female officers per year (DoD, 2016). This growth in the junior female officer population is accounting for a larger percentage of the rise in the female officer population and total officer population, overshadowing the loss in the O-4 to O-6 female officers and compensating for losses in male officers. This suggests that the Navy has been effectively recruiting female officers, but not retaining them.

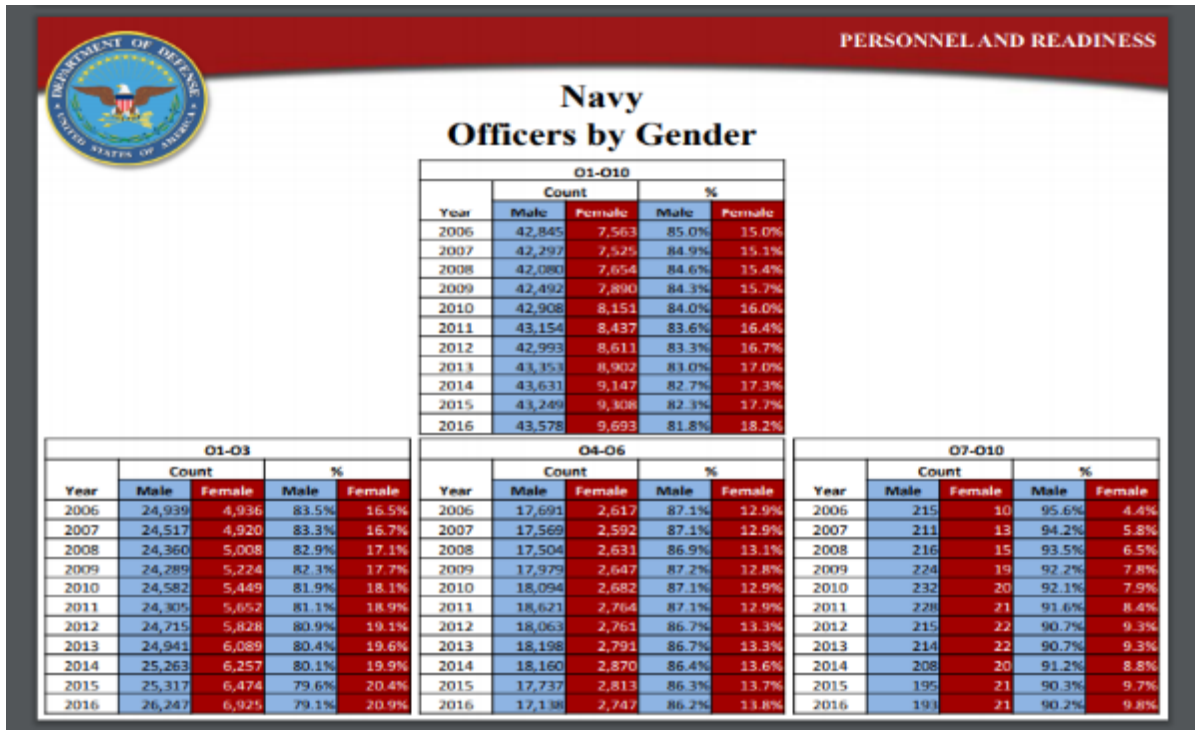


Figure 2. Navy Officers Demographic Changes by Gender from 2006 to 2016. Source: DoD (2016).

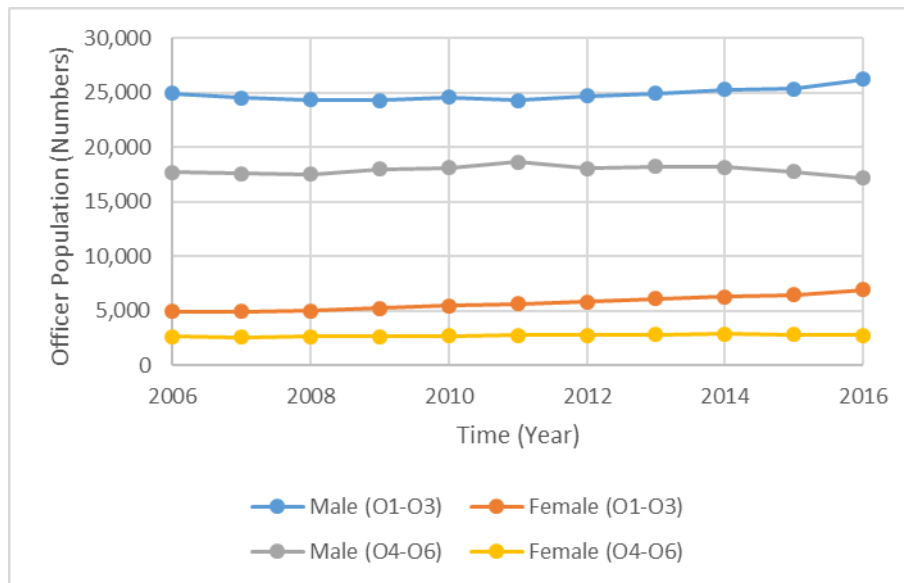


Figure 3. Naval Officer Population Trend in Numbers, Paygrades O-1 to O-6. Adapted from DoD (2016).

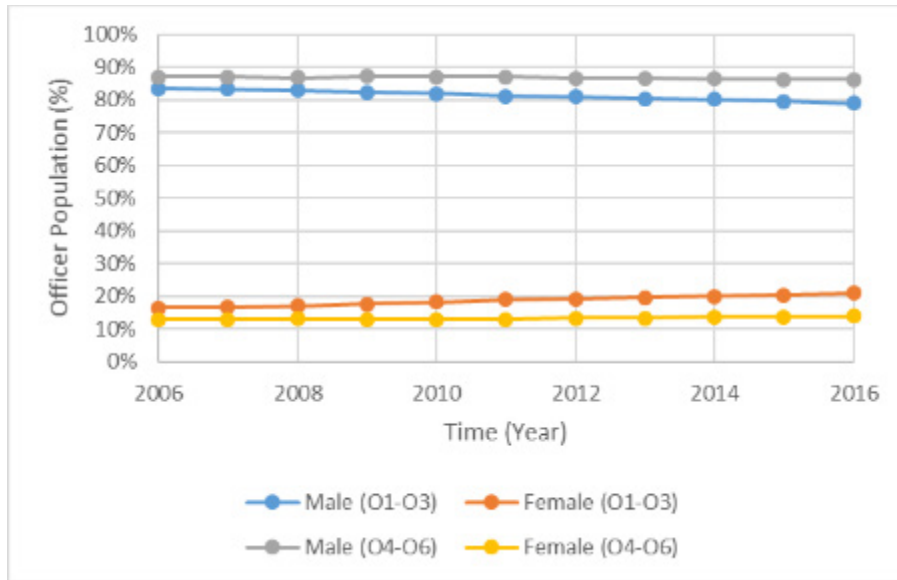


Figure 4. Naval Officer Population Trend in Percentage, Paygrades O-1 to O-6. Adapted from DoD (2016).

The exact cause for the declining seasoned female officer demographics is not readily identifiable. The drop in this population subgroup can be due to the effects of promotions, retirement, or separation prior to retirement. Fewer women promoting to the pay grades of O-4 to O-6 translates to less gains. A Navy-sponsored study by CNA Analysis and Solutions, *Female and Minority Representation in the Navy*, analyzed the representation trends of minority and female officers in the Navy between the fiscal years of 1975 to 2015. The researchers concluded, “For women and minorities, we show that low levels of representation after screening and promotion boards are due primarily to low levels of representation when the officers accessed, not specifically to the screening and promotion boards” (Huff, Smirnov, Taxler, & Lee, 2018, p. i). This suggests that the loss in the seasoned female officer population is not due to a promotion problem.

If the decline in seasoned female officer population is not due to a promotion effect, then the separation effect must be considered. It is difficult to distinguish if losses are primarily due to women in the O-4 to O-6 subgroup separating due to retirement, or more often voluntarily separating earlier. However, at the 2016 Force of the Future Reforms Pentagon Press Briefing, former Secretary of Defense (SECDEF) Ashton Carter highlighted the sharp retention reduction for women at ten years of service mark. Carter

(2016) stated that “at 10 years of service, when women are at their peak years for starting a family, women are retained at a rate 30 percent lower than men across the services.” Ten years of service typically correlates to the O-4 paygrade for officers who were not prior enlisted. Therefore, this suggests that the declining seasoned officer population may be due to women simply leaving the Navy well before retirement.

Furthermore, the correlation SECDEF Carter notes between seasoned women officers, family starting, and retention underscores the 2016 and 2018 Navy survey *Retention Influencers* that cited that the primary influencer to leave the Navy for female officers was the ability to have a family. This suggests that the Navy may be inadequately retaining its seasoned female officers due the adverse impact of a naval career on the ability to have a family.

4. Effect of Women Leaving

While the Navy’s total women population may be rising due to junior female officer population growth, a lower retention of seasoned female officers is a leadership and manpower efficiency degradation for the Navy. First, a less experienced junior officer is not an even exchange in talent for a seasoned officer. Less women in higher leadership positions reflects a gap in retaining highly trained female officers, resulting in a loss of experience, training, leadership, and direct mentorship. This adversely affects the perception of junior female officers and their desire to remain in the Navy beyond their minimum service requirement (MSR). Naval Postgraduate School graduates Ceralde and Czepiel (2014) concluded in their thesis, *Maximizing Female Retention in the Navy*, that “the Navy’s inability to retain female officers may cause an unwanted perception of career plateauing among its female officers. This may further influence women on their retention decisions” (p. 15). Therefore, this concern must be addressed to limit the overall talent and manpower drain in the Navy.

C. RETENTION STRATEGIES AND SHORTCOMINGS

1. Retention Bonus

Retention bonuses are utilized as a direct monetary incentivizing retention tool. In an effort to keep the current talent pool, the Navy awards bonus money to specific designators in an effort to stay current with the civilian sector job market. The retention bonus is formulated to retain quality designator-specific officers and to reward exceptional performance. An early selection of an officer to successfully qualify and commit to serve in the capacity of a department head is solidified through a retention bonus. Capt. Rick Cheeseman, Director of the Surface Warfare Officer Assignments Division, Navy Personnel Command (NPC) stated, “With this bonus, the Navy rewards superior performance at sea with a potentially larger bonus package earlier in our junior officers’ careers—basically, the earlier they screen and commit, the larger their bonus” (Navy Personnel Command Public Affairs, 2016). The SWO Department Head Retention Bonus is summarized as follows:

To qualify for the DHRB, officers must be qualified and currently serving as an active duty SWO. Officers must also complete at least one division officer tour, or be assigned to a fleet-up or single longer tour as approved by Naval Personnel Command; administratively screen for department head afloat; and agree to two afloat department head tours or a single longer tour assigned by NPC. Officers selected for department head must submit a contract prior to the convening of the next Department Head Screen Board in order to receive the full bonus. (DoD, 2016)

In spite of a bonus to incentivize naval officers to stay in the Navy for continued service, there are still shortfalls with retention. For many of the designators that provide a retention bonus, the jobs are of arduous duty. Therefore, designators like SWOs and nuclear officers (Surface and Subs) still have low retention rates. For many, a holistic career path that encourages a proper work-life balance is deemed more important than additional money. Gardarsdottir, Dittmar, and Aspinall (2009) explain that “development and maintenance of high-quality relationships, social support networks, self-awareness, and autonomy have all been identified as crucial for well-being and are therefore more realistic paths to happiness” (p. 1124).

2. Lateral Transfer

Lateral transfers are utilized as a retention tool that offers career flexibility. A lateral transfer is a great opportunity for an officer who has met his or her minimum requirements to serve in a different capacity within the Navy. Once a request is approved, the naval officer is afforded the freedom to transfer and utilize their talents in another designator. Simply, it allows an officer to request changing to another job. The Navy's lateral transfer instruction states the following:

The active duty member must have completed at least 24 months of active commissioned service above the grade of CWO4. An officer may not request transfer from the Unrestricted Line until within 6 months of completing obligatory service in the present community as a result of functional training received (training received that further enables an Unrestricted Line officer to perform their duties such as department head school). Each designator will have warfare qualification specific requirements to be approved. For example, Surface officers who are under orders to Department Head School may not laterally transfer until completion of initial Department Head Tour. In addition, officers who are exempted from participation in warfare qualification programs must complete a minimum of 2 years of active commissioned service before applying. (DoN, 2002)

Although a great retention tool overall for the Navy, lateral transfers result in a talent drain or overmanning within specific communities. The designator the officer is withdrawing from (as a result of lateral transfer) is losing a trained, qualified officer who has that particular warfighting capability. Also, the gaining community may receive too many officers to adequately train and utilize. Naval Postgraduate School graduate Frank J. Ryan III (2007) concludes in his thesis that "the results of the regression analysis [indicate] that officers not selected for lateral transfer and resignation are twice as likely to leave the Navy as officers who are selected." This suggests that lateral transfers are an insufficient retention tool for the critical URL communities, for both men and women.

3. Career Intermission Program

The Career Intermission Program (CIP) is utilized as a retention tool that offers career flexibility to service members through a temporary break in service. In 2009, the Career Intermission Pilot Program was implemented to determine if the Navy could

increase retention of service members with critical skills by providing greater career flexibility (DoN, 2012). When the CIP program was first implemented, the CIP instruction stated that, “The Career Intermission Program allows Officers and enlisted Sailors the ability to transfer out of the active component and into the Individual Ready Reserve for up to 3 years while retaining full health care coverage and base privileges” (DoN, 2012). As a result, a quota of 20 officers and 20 enlisted Sailors was given a one-time transition out of active duty into the Individual Ready Reserve, commonly known as a temporary off ramp. This off ramp could be used for a variety of purposes to include starting a family, caring for elderly family, or conducting an international aid mission. As of 2016, 48 officers have participated in CIP and the program has no quota limitations (DoN, 2012).

While CIP provides great career flexibility, it may not be a sufficient retention tool. According to *NAWCTSD 2016 Pregnancy and Parenthood Executive Survey*, “Of those who are familiar with CIP, the majority believe that it has no impact on their motivation to remain in the Navy” (NAWCTSD, 2016). Furthermore, it has major drawbacks, including reduced income, extended serving obligations, and delayed promotion.

During CIP participation, service members receive a stipend of two times 1/30th of their basic pay (DoN, 2018). For example, a lieutenant with six years of service would earn less than \$400 per month before taxes. In addition, upon returning to active duty (AD), service members are required to serve two months for every month of participation in CIP. Since CIP requires a minimum participation of 12 months, this results in 24 months extended obligated service that must be served consecutively and in addition to any remaining and future obligations. Finally, taking CIP effectively delays promotion for two years. While the program does not to penalize officer promotions due to this break in service with CIP, promotion eligibility is automatically deferred one year to align with the new peer group after returning to AD, unless the service member requests to be considered (DoN, 2018). This is intended to give the officer time to regain competitiveness for promotions. Therefore, promotion eligibility is paused for the year while on CIP and for the following year. For a competitive, hard-charging woman who is physically capable of having a child and getting back to work fairly quickly, the pay cut, delayed promotion

effect, and additional service requirement when otherwise unnecessary would make CIP unappealing.

4. Blended Retirement System

The Blended Retirement System offers a cost savings for the DoD and serves as a retention tool by offering career retirement savings. The new military “Blended Retirement System” (BRS) is now in effect for all new entrants into the military (Absher, n.d.). BRS provides flexibility for service members to end their time in service while receiving a percentage retirement benefit without the traditional retirement system that required service up to 20 years. The BRS is summarized as follows:

BRS blends two major sources of retirement income: the existing annuity provision for those who retire after 20 or more years of service and the Thrift Savings Plan (TSP). The TSP is a government run 401(k) retirement account that allows members to invest their own money in either stocks or government securities and also get a contribution to that account from their employer. (Absher, n.d.)

The BRS will use the annuity formula currently in place; the average of the service member’s highest 36 months of basic pay times 2.5% of their years of service. Also, the 2.5% is adjusted downward by half of a percentage point, from 2.5 to 2%. To make up for this reduction the government will contribute to a member’s Thrift Savings Plan (TSP). After the first 60 days in the service, all members will be enrolled in TSP and receive an automatic government contribution of 1% of basic pay into their account each month. Additionally, they will be automatically enrolled to contribute 3% of their basic pay to the TSP each month (they can change or stop this at any time). After two years of service, the government will match the member’s contributions up to an additional 4%. So, after two years of service, members can get up to a 5% government matching contribution on top of what they contribute each month. Therefore, if a member contributes 5% of their basic pay the government will match it, making a total contribution to the TSP of 10% of their basic pay. (Absher, n.d.)

Although there are benefits to serving in the military without the obligation of completing 20 years of service to receive compensation from the Navy, this does not benefit the Navy regarding long-term retention. This benefit favors women in their opportunity to leave the Navy and enter the civilian sector to pursue another career and personal goals,

including family starting. From the Navy's perspective, they will still lose on retaining talented officers whom they have spent time training for warfighting capabilities.

5. Extended Maternity Leave

Maternity leave is a health and retention tool that assists service members with work-life balance. It is a true benefit for women, providing adequate time off after women have given birth. The policy also permits men to take time off to be with mother and newborn baby. SECNAV Ray Mabus announced on July 2, 2015, "Effective immediately, women who serve in the Navy and Marine Corps will have 18 weeks of maternity leave available to use during the first year of her child's life." SECNAV Mabus is quoted: "We have incredibly talented women who want to serve, and they also want to be mothers and have the time to fulfill that important role the right way." Mabus continues, "We can do that for them. Meaningful maternity leave when it matters most is one of the best ways that we can support the women who serve our country. This flexibility is an investment in our people and our Services, and a safeguard against losing skilled service members" (DoN, 2015).

The new maternity leave policy applies to active component members, and Reserve component members serving on call or orders to active service for a continuous period of at least 12 months. Guidance outlined in the Navy's maternity leave policy is as follows:

No member shall be disadvantaged in her career, including limitations in her assignments (except in the case where she voluntarily agrees to accept an assignment limitation), performance appraisals, or selection for professional military education or training, solely because she has taken maternity leave." (DoN, 2015)

The shortcoming regarding the maternity leave policy and retaining season women is that the maternity leave policy only applies *after* the member has given birth and has no relevance to the initial phase of family planning and reproductive cycle up until pregnancy. Although maternity leave is considered an advantageous retention tool, women in the Navy that are not provided an inclusive environment to start the phases of conception will not benefit from this opportunity.

D. EXPLORING EF/IVF AS AN ADDITIONAL RETENTION TOOL

1. Types of Fertility Assistance

Egg freezing and in vitro fertilization (EF/IVF) are medical procedures used to assist women in preserving fertility and treating infertility to start or expand families. “Egg freezing, or oocyte cryopreservation, is a process in which a woman’s eggs (oocytes) are extracted, frozen and stored as a method to preserve reproductive potential in women of reproductive age” (University of California [UCLA] Obstetrics and Gynecology, n.d., para. 1). Infertility treatments consist of medication, surgery, intrauterine insemination, and assisted reproductive technology (ART; Centers for Disease Control and Prevention [CDC], 2019b, para. 3).

Medications such as fertility drugs and hormone treatments aid women in ovulating or restoring hormone levels. Corrective surgery can be used to remove fertility blocking tissue (endometriosis) or open blocked fallopian tubes (WebMD, 2017, para. 5). Intrauterine insemination, also called artificial insemination (IUI), is a procedure in which sperm is directly injected into the woman’s body (CDC, 2019b, para. 2). Hormonal medicine often is used in conjunction with IUI in order to simulate the woman’s ovulation prior to the procedure. This treatment is used to correct mild male-related infertility factor or unexplained fertility before seeking more invasion procedures. In vitro fertilization (IVF), the most common and effective form of assisted reproductive technology (ART), is utilized in the event that other infertility treatment options are not appropriate or have failed (CDC, 2019b, para. 2). The CDC has defined ART as the following:

ART includes all fertility treatments in which both eggs and embryos are handled outside of the body. In general, ART procedures involve removing mature eggs from a woman’s ovaries using a needle, combining the eggs with sperm in the laboratory, and returning the embryos to the woman’s body or donating them to another woman. (CDC, 2019b, para 4)

Intracytoplasmic sperm injection (ICSI) is a special type of IVF in which a single sperm is directly injected into an egg. This treatment is most severe case due to the male-related infertility factor (CDC, 2019b, para. 4). Other forms of ART that rarely utilized in the United States due to lower success rates include Zygote intrafallopian transfer (ZIFT) and Gamete intrafallopian transfer (GIFT). The CDC has defined ZIFT and GIFT as the following:

Zygote intrafallopian transfer (ZIFT) or tubal embryo transfer is similar to IVF. Fertilization occurs in the laboratory. Then the very young embryo is transferred to the fallopian tube instead of the uterus. Gamete intrafallopian transfer (GIFT) involves transferring eggs and sperm into the woman's fallopian tube. Fertilization occurs in the woman's body (CDC, 2019b, para. 4).

2. Technological Advances

In 1978, the first baby was born through IVF using ART in Europe (European Society of Human Reproduction and Embryology, 2018, para. 1). Since then, ART technology has matured and contributed to over eight million births worldwide. In 2016, the latest Centers for Disease Control and Prevention (CDC) ART National Summary Report cited that ART resulted in over 66,000 live births with over 77,000 infants to including multiple infant births (CDC, 2019a, para. 3). Currently, almost 2% of the U.S. population are born every year using ART (CDC, 2019a, para. 3).

ART success rates in infant births have increased and remain a growing trend throughout the different types of ART cycles. Success rates vary depending on the type of cycle treatment utilized, age, and medical history (CDC, 2019a, para. 2). Due to various input factors, there is not a single total percentage of ART treatment success. However, the success of all ART treatments cycles with fresh or frozen eggs and embryos have vastly progressed since the first ART procedure was performed. According to the CDC 2016 ART National Summary Report, IVF currently results in approximately 31% success rate for live birth and decreases with age (CDC, 2016). However, for many families, EF/IVF is their only remaining option for a successful pregnancy and birth.

3. Societal Expectations

Infertility effects one in eight Americans, which surpasses major illnesses such as breast cancer and diabetes (FertilityIQ, 2018). As women fulfill their educational and career desires, there is a trade-off of delaying childbirth. Although there are varying factors for each woman's infertility issues, age is a major factor. The CDC reports that fertility in women declines with age and is commonly known as the "biological clock" (CDC, 2019b, para 8). According to the CDC, "Aging decreases a woman's chances of having a baby in the following ways: she has a smaller number of eggs left; her eggs are not as healthy; she

is more likely to have health conditions that can cause fertility problems; and she is more likely to have a miscarriage” (CDC, 2019b, para 8). Many couples struggle with infertility and seek help to become pregnant. While both men and women can contribute to infertility, this is predominantly an issue for women due to the biological clock effect.

Women now are requiring Assisted Reproductive Technology (ART) more frequently to have a family, and future generations of women will expect more family-friendly work policies within their career choices, including these benefits. Increases in the need for funding fertility assistance are noticed by top employers. Major corporations are now devoted to supporting the holistic needs of their employees. As the needs of talented employees change, so do the desires of their employers. These changes can be correlated to the generational needs and desires. As highly educated and talented women progress in their careers, they desire more than solely working to obtain income. “There is consistent evidence for a moderate negative association between the pursuit of financial goals and subjective well-being” (Gardarsdottir et al., 2009, p. 1).

4. Use by Industries

Top competitors for talent currently recognize the need for medical coverage in order to adequately support families and attract educated women. In a 2017 article by the *Business Insider*, journalist Lydia Ramsey reports on corporate companies that provide their female employees with IVF services as shown in Table 1. Ramsey provides a list of companies that are providing IVF treatment for their employees. Some companies, such as Spotify (a music streaming company), legal firms (like Ropes and Gray), Bank of America, and BCG (a consulting group), provide unlimited IVF coverage. Other companies, such as the coffee giant Starbucks, provide up to \$150,000 in coverage. Finally, Pinterest, Facebook, and the Gates Foundation (intellectual companies) provide up to \$100,000 in treatment (Ramsey, 2017, para. 9).

Starbucks is investing a large amount of its revenue into not only their employees’ regular healthcare, but also their reproductive health. Starbucks Chief Partner Officer Lucy Helm explained during a 2017 CBS interview with Anna Werner, “It’s just been part of who we are, that if you work here (Starbucks) and you put in the time, you’re going to get

the benefits that make you a full partner” (Ramsey, 2017, para. 5). From a business perspective, there is a benefit for Starbucks that should resonate with the U.S. Navy. Ramsey stated the following.

Business professor Craig Garthwaite, with Northwestern University’s Kellogg School of Management, says it’s not just about making employees happy. “In the end, Starbucks is a for-profit, publically traded company,” he said. “They’re not doing this out of the goodness of their heart. This is part of a cohesive strategy they have for how to attract and retain talent.” (Ramsey, 2017, para. 11)

It would be reasonable to assume that in addition to Starbucks, the other corporate companies previously mentioned are utilizing EF/ IVF also for the purpose to attract and retain talent. It would be just as imperative for the Navy to consider the civilian sector’s current retention tools. If EF/IVF were implemented, the Navy could maintain a competitive advantage that conforms to the rising “norm” of today’s private and public companies.

5. Potential to Increase the Navy’s Retention of Women

EF/IVF can serve as a potential retention tool since it would benefit the Navy in taking care of its people, the mission, and leading the societal workforce competition. As women delay family starting, they may ultimately sacrifice their ability to have children due to the biological clock effect. According to former SECDEF Carter, “By freezing their eggs, they will have the flexibility to remain deployed overseas or otherwise pursue their careers and put off having children” (Carter, 2016). Since the rising generation places greater priority on work-life family balance, the Navy must address this concern that predominantly affects women in order to effectively build the force for the future (Carter, 2016). Therefore, as the Navy seeks to recruit talented women and retain the skillful warfighters it has invested in, EF/IVF should be explored as a retention tool within a comprehensive retention strategy.

Table 1. The FertilityIQ Family Builder Workplace Index: 2017–2018.
Source: FertilityIQ (2018).

2017 - 2018 Employers With The Most Generous IVF Coverage

EMPLOYER	INDUSTRY	TOTAL POINTS	COVERAGE (100,000 POINTS MAX)	"UNLIMITED COVERAGE" BONUS	ACCESSIBILITY BONUS	COVERAGE DETAILS	PRE-AUTHORIZATION
Bain	Consulting	125,000	Unlimited	25,000	None	Unlimited	Standard
BCG	Consulting	125,000	Unlimited	25,000	None	Unlimited	Standard
Chanel	Fashion	125,000	Unlimited	25,000	None	Unlimited	Standard
Bank of America	Finance	125,000	Unlimited	25,000	None	Unlimited	Standard
KKR	Finance	125,000	Unlimited	25,000	None	Unlimited	Standard
Ropes and Gray	Legal	125,000	Unlimited	25,000	None	Unlimited	Standard
Gates Foundation	Non-Profit	125,000	\$100,000	None	25,000	4 Cycles + PGS	None
Facebook	Technology	125,000	\$100,000	None	25,000	4 Cycles + PGS	None
Pinterest	Technology	125,000	\$100,000	None	25,000	4 Cycles + PGS	None
Spotify	Technology	125,000	Unlimited	25,000	None	Unlimited	Standard
Pyramid Hotel Group	Travel	125,000	Unlimited	25,000	None	Unlimited	Standard
City of Baltimore	Government	120,000	\$120,000	None	None	6 Cycles	Standard
Conair	Consumer	100,000	\$100,000	None	None	\$100,000	Standard
Unilever	Consumer	100,000	\$75,000	None	25,000	\$100,000	None
Johns Hopkins	Education	100,000	\$100,000	None	None	\$100,000	Standard
LinkedIn	Technology	100,000	\$75,000	None	25,000	3 Cycles + PGS	None
University of Maryland	Education	100,000	\$100,000	None	None	5 Cycles	Standard
News Corp	Media	100,000	\$75,000	None	25,000	3 Cycles + PGS	None
Google	Technology	100,000	\$75,000	None	25,000	3 Cycles + PGS	None
Salesforce	Technology	100,000	\$75,000	None	25,000	3 Cycles + PGS	None

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III. THEORETICAL FRAMEWORKS AND RESEARCH APPROACH

A. INTRODUCTION

The purpose of this research is to assess the viability of implementing egg freezing and in vitro fertilization (EF/IVF) as an additional retention tool for competitive female naval officers. This chapter assesses the underlying ethical and financial frameworks and methods that will be used in this research. The ethical perspective provides reasoning for implementing the proposed EF/IVF pilot program, and the financial perspective provides a price for implementing the program.

B. ETHICAL PERSPECTIVE

1. Theoretical Framework

Distributive justice derives from the distribution of conditions and goods among individuals (Deutsch, 1975). Deutsch (1975) argues that (1) individuals may sense injustice from perceived unjust values, the rules that represent the values, the ways the rules are implemented, or the ways that decisions are made, (2) a system of justice is undergirded by many values, including equity, equality, and need, and (3) the essential values of distributive justice are those that promote social cooperation leading to individual well-being. Equity is typically defined as the equivalence of the outcome to input ratios of all parties involved in the exchange (Adams, 1965; Walster, E., Berscheid, & Walster, G., 1973). The “equity rule” is also labeled the “contributions rule” (i.e., equality of outcome/input ratios or equality relative to individual contributions). Therefore, when these ratios are not equal, inequity is said to exist. The “equality rule” is traditionally referred to in the justice literature (i.e., equal amounts to each recipient) as “objective equality” (Cook & Hegtvedt, 1983). Finally, the “need rule” is classified as a principle of “subjective equality” (Cook & Hegtvedt, 1983). For example, the equality of outcomes considers need of personal welfare.

To better understand this framework, Deutsch (1975) offers propositions to explain which of the three values will drive distribution outcomes, as follows:

In cooperative relations in which economic productivity is a primary goal, equity rather than equality or need will be the dominant principle of distributive justice. In cooperative relations in which the fostering or maintenance of enjoyable social relations is the common goal, equality will be the dominant principle of distributive justice. In cooperative relations in which the fostering of personal development and personal welfare is the common goal, need will be the dominant principle of distributive justice. (Deutsch, 1975)

It is essential that the Navy be concerned about each of these distributive outcomes to maintain a cohesive organization. For example, the Navy must achieve mission requirements, which while not financial, are an output outcome. Although enjoyable social relations are not a primary outcome, teamwork and camaraderie are vital to mission success. Finally, naval leaders have frequently noted the importance of personal development within its service members.

Deutsch's (1975) framework promotes the idea that "people are more apt to accept decisions and their consequences if they have participated in making them" (p. 138). Progressing forward, individuals will be more willing to commit and contribute maximum effort to an organization if their engagement enhances the legitimacy of the reward system.

2. Research Approach

This research will explore each of Deutsch's essential values: equity, equality, and need to understand the ethical implications of the EF/IVF policy. The research findings are a means to explore the implementation of EF/IVF as retention tool. The researchers will also explore similar current policies from the same framework to assess the viability and implications of the EF/IVF policy.

The following policies were collected from the official Naval Personnel Command (NAVPERS) instructions library. Considering EF/IVF is not a current policy, we will use the policies of Navy Physical Readiness, Navy Equal Opportunity, and Navy Pregnancy & Parenthood to assess if EF/IVF is an applicable retention tool by utilizing the Deutsch's theoretical framework. Table 2 provides ethical framework that will be analyzed in conjunction with naval policies:

Table 2. Deutsch’s Ethical Framework and Naval Policies

Equity	Navy Physical Readiness Instruction OPNAVINST 6110.1
Equality	Navy Equal Opportunity Policy OPNAVINST 5354.1
Need	Navy Pregnancy & Parenthood Policy OPNAVINST 6000.1

C. FINANCIAL PERSPECTIVE

1. Theoretical Framework

Activity-based costing (ABC) is a cost tool that aids in tracking and determining the cost of a product or service based on the cost of the resources it consumes (Brewer, Garrison, & Noreen, 2015, p. 294). ABC uses technological advances to make complex cost-management systems more feasible by accounting for the different types of cost, cost drivers, and activity cost pools within production and service sectors. In ABC, the cost for a product or service is allocated based on the pool of activities it requires. The activities that make up the cost-based pools, or activity cost pools, consume resources. Therefore, the overall product or service cost is a function of the resources utilized to provide the product or service requested as shown in ABC model in Figure 5. In the book *Managerial Accounting*, authors Brewer, Garrison, and Noreen (2015) highlighted that “ABC is a costing method that is designed to provide managers with the cost information for strategic and other decisions that affect capacity and therefore fixed as well as variable costs” (p. 287).

2. Research Approach

To derive the price of a potential EF/IVF retention tool, the researchers will use the ABC method. In derivation of an average price estimation, this will focus on the potential average price for a proposed EF/IVF pilot program. The general ABC model is shown in Figure 5:

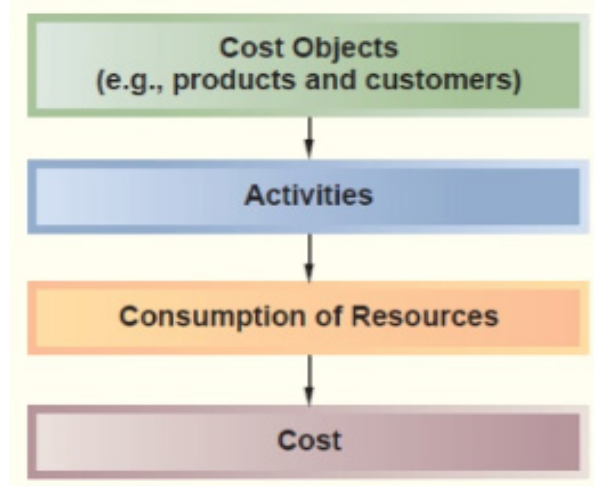


Figure 5. Activity-Based Costing Model. Source: Brewer et al. (2015).

The definitions of the ABC model are shown in Table 3.

Table 3. Definitions for ABC Model. Adapted from Brewer et al. (2015).

Cost Objects	Any object that consumes resources. Examples include products, customers, jobs, and parts of an organization such as departments or divisions.
Activities	Any event that causes the consumption of overhead resources. An activity cost pool is a “bucket” in which costs are accumulated that relate to a single activity measure in the ABC system. An activity measure is an allocation base in an ABC system (i.e., labor hours or number of items).
Consumption of Resource	The use of resources by an activity in order to meet the need request of a cost object.

For the purposes of this research, the model’s cost will be the average program price (APP) for each woman to obtain fertility assistance within the pilot program. The ABC model will be constructed in a two-stage approach and for two military treatment facilities (MTFs) which will serve as baseline MTFs for the price estimation. Medical activities are grouped together based on the fertility medical procedure a servicewoman

undergoes. The associated cost of the pool of activities, or activity cost pools, will be measured by the price charged per cycle by the MTFs for the given fertility procedure. A cycle is the completion of a given procedure. The sum of all the combinations of fertility procedures and its associated price per cycle at an MTF is the average program rate (APR). For the proposed EF/IVF pilot program, an APR will be calculated for each of the model's baseline MTFs. This will account for the expected price variation in obtaining medical treatment resulting from geographically differences between the East coast and West coasts of the United States. Upon obtaining the APR for the two MTFs, the average program price per MTF (APP) will be determined by the following equation:

$$APP = APR * Q$$

where

APP: Average program price per MTF. Units: FY19\$

APR : Average price per servicewomen in obtaining at least one cycle of all fertility assistance routes and measured by the sum of all fertility assistance routes.
Units: \$/woman

Q: Number of program participants. Units: women

The two MTFs APP calculated will provide an estimated price range for the proposed EF/IVF pilot program and determined as follows:

Range: Lowest APP to Highest APP

Finally, the overall average program price (OAPP) for the proposed EF/IVF pilot program will be determined by taking an average of the two APP and calculated as follows:

$$OAPP = \frac{\text{Highest APP} + \text{Lowest APP}}{2}$$

where

Overall APP: Overall average program price for the proposed EF/IVF pilot program

Lowest APP: Average program price of the MTF with the lowest APP

Highest APP: Average program price of the MTF with the highest APP

Data used in the proposed EF/IVF pilot program cost estimation are from fiscal year 2019 (FY19) and were collected from the six MTFs that provide fertility assistance and their associated civilian contracting facilities, as listed in Table 4:

Table 4. Military Treatment Facilities (MTF) that Provide Fertility Assistance Treatment. Adapted from DoD (2015).

7 Military Treatment Facilities (MTF)	Location	Contracted Facility
Walter Reed National Military Medical Center (WRNMMC)	Bethesda, MD	ART Institute of Washington
Madigan Army Medical Center (MAMC)	Seattle, WA	Seattle Reproductive Medicine
Brooke Army Medical Center (BAMC)	Houston, TX	Fertility Center of San Antonio
Womack Army Medical Center (WAMC)	Fort Bragg, NC	North Carolina IVF Lab
Tripler Army Medical Center (TAMC)	Honolulu, HI	Fertility Institute of Hawaii
Naval Medical Center San Diego (NMCSD)	San Diego, CA	San Diego Fertility Center

D. CONCLUSION

The ethical framework of distributive justice rationalizes how the three values of equity, equality, and need drives outcomes. Deutsch (1975) theorized that rewarding people based on what an organization deems is relevant, rather than in considering the inputs of the members of the organization, leads to injustice when distributing rewards (p. 138). Through the research of exploring EF/IVF through Deutsch's approach, the researchers linked an appropriate rationale for implementing the policy and researched current naval policies that exhibit the values of equity, equality, and need. The analysis outcome of implementing EF/IVF as a retention tool through the lens of Deutsch's (1975) distributive justice framework is proven justifiable. The Navy needs to consider that personal sacrifice to stay competitive is not the same for women and men, and that an enabling environment is the only way for enhancement of a diverse senior leadership.

While the ethical perspective provided justification for considering EF/IVF as a retention tool, in the financial perspective, the researchers will demonstrate the cost in implementing a proposed EF/IVF pilot program for DoD budgeting and decision-making purposes. The ethical framework will assess EF/IVF from a qualitative point of view and utilize naval policies for comparable evidence; the financial framework supports the ethical framework from a quantitative point of view in which the researchers will compute an estimated average program price using MTF price data. The financial research model will consist of the ABC method as it provides a more accurate and efficient cost management system, which improves future cost estimations for products and services. Although the research model data will utilize prices charged by the MTFs instead of the actual costs to provide EF/IVF services, the ABC method and model is still useful by providing a logical approach to establish a price model that would yield an average price estimation similar to an average cost estimation.

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IV. ANALYSES

A. INTRODUCTION

The purpose of this research is to assess the viability of implementing egg freezing and in vitro fertilization (EF/IVF) as an additional retention tool for competitive female naval officers. The research proposes an EF/IVF pilot program, which will be analyzed from an ethical and financial perspective. Findings from the analyses will be considered in determining if a possible recommendation for the Navy to implement EF/IVF as an additional retention tool should be supported. Through the application of the ethical framework, the researchers will provide an analysis based on distributive justice and demonstrate a meaningful interrelationship between women's retention and the implementation of EF/IVF as a retention tool. Through the application of the financial theoretical framework, the researchers utilize the activity-base costing (ABC) method to establish a price estimation model and use military treatment facility (MTF) data to compute how much a proposed EF/IVF pilot program would cost.

B. ETHICAL ANALYSIS

1. Equity Analysis

As previously defined, equity is the equivalence of the outcome/input ratios of all parties involved in the exchange (Adams, 1965; Walster et al., 1973). From a perspective of equity, men and women are not physically able to be held to the same standards the Navy has to consider the limitation differences of both women and men. Unlike men, women are required to plan for pregnancy between specific career milestones. A woman cannot be in a deployment status while pregnant. Competitive women who desire to have children find it hard to start a family in the earlier phases of their career; therefore, as they wait until a more appropriate career timeframe, there is an increased risk of infertility.

The analysis suggests that the Navy's Physical Readiness Test (PRT) is equitable. The Navy assesses personal physical fitness and body composition assessments for both men and women that are specific to age and gender specifics through the PRT. By accounting for these differences in gender and sex, there is value in differentiating physical

readiness standards to ensure success within the respective genders. From the lens of Deutsch's framework, the PRT policy is equitable. Similar to the PRT standards that are gender specific to ensure that there is proportionality between the individuals' outcomes, consider the implementing of EF/IVF as an equitable retention tool for competitive female officers.

2. Equality Analysis

When fostering enjoyable, personal relations is the primary goal, equality is referred to as the "objective equality" (Cook & Hegtvedt, 1983). From the perspective of equality, every servicemember needs to be treated with the same level of respect and everyone that is qualified to serve needs to be accepted. The Navy has to consider the importance of a diverse environment in senior leadership positions. In order to have a diverse leadership an equally diverse environment must be created for mid-level leadership to grow.

The Navy's Equal Opportunity policy exhibits equality. The Navy's Equal Opportunity (EO) policy is developed to ensure the organization is comprised of men and women who work together to accomplish the mission. The EO policy ensures that each member of the Navy is entitled to be treated with dignity and respect and to work in an environment free of harassment and unlawful discrimination. The equal opportunity policy implements the value of diversity to include, ethical racial and gender diversity. From the perspective of Deutsch (1975), the Navy's EO policy displays equality. Implementation of the EF/IV program allows talented women the opportunity to remain as competitive as men, which will increase the growth of a more diverse top leadership in the Navy. The Navy needs to consider whether career paths are equal for both men and women to progress into higher leadership positions. Therefore, the principle of equality is a viable justification for providing EF/IVF as a retention tool.

3. Need Analysis

Finally, the "need rule" that was classified as a principle of "subjective equality" fosters personal development and personal welfare (Cook & Hegtvedt, 1983). There is a reciprocating responsibility of "need" for servicemembers to receive and pursue personal

development and personal welfare within the Navy. The Navy needs to consider taking care of its servicemembers who volunteer to serve the country.

Analyzing the *Navy's Pregnancy & Parenthood Policy*, the value of need is addressed. The pregnancy and parenthood policy is enforced when a service woman becomes pregnant (once notified of conception). She is reassigned from her current deployment status to pregnancy status and transferred to a non-arduous duty command. This policy implements the value of a need to take care of women once they are pregnant. However, since this policy removes women from deployment status, many competitive female officers often choose to forgo child bearing in order to stay operational. The effect of trying to stay competitive is a sacrifice in which women develop fertility risks above the age of 35.

Implementing the EF/IVF program provides an enabling environment to encourage a women's ability to start a family within a timeframe that will not remove her from a deployment status due to ability to reserve conception to a later more convenient timeframe in a women's career. Providing the opportunity for a woman to start a family between career milestones creates an enabling environment for women to stay in the Navy, remain promotable, and increase diversity within naval senior leadership.

C. FINANCIAL ANALYSIS

1. Research Model Description and Data Source

The financial analysis of this study contains an expanded two-stage, modified activity-based costing (ABC) model. It is modified from the general ABC model by having the model's activities grouped into a pool of activities and their related cost, called activity cost pools. Two activity cost pool stages are incorporated into the model, in which the first stage activity cost pool shows each procedure a woman would undergo in obtaining fertility assistance. The second stage activity cost pools, called routes, show the sum total of procedures, or first stage activity cost pools, that would be required for a woman to achieve fertility if the procedures were performed in a sequence and are successful. This modification of the ABC method and model provides a logical approach to performing program price estimate using the widely utilized general ABC concept in today's cost

accounting and cost estimations, while modifying it to support the EF/IVF pricing sequence.

The research model is constructed as follows: the estimated program price computation begins with the assessing the need for the cost objective, competitive female naval officers. Once the fertility assistance needs are determined, they are classified into activities based on the resources they would require. Prices are allocated to these activities within the first stage activity cost pool rate, and the first stage activity cost pool rates are summed up into the appropriate second activity cost pool rate (routes). This allows the average program rate per servicewoman (APR), average program price per military treatment facility (APP), and then ultimately the overall average program price (OAPP) and range to be determined respectively.

Data for the research model were collected from six MTFs and their associated civilian contracting facilities that provide substantial fertility treatment options. Of the six MTFs, two MTFs, Walter Reed National Military Medical Center (WRNMMC) located in Bethesda, MD, and Tripler Army Medical Center (TAMC) located in Honolulu, HI, were selected as the baseline MTFs for the proposed EF/IVF pilot program due to complete price data provided to perform the financial analysis. The research model computations are performed for each MTF to determine their APP. The range of the overall average APP will be determined by the upper and lower limits of the MTFs APP. Finally, the OAPP will be determined by taking an average of the MTFs' APP.

2. Research Model

The research model is provided in Figure 6:

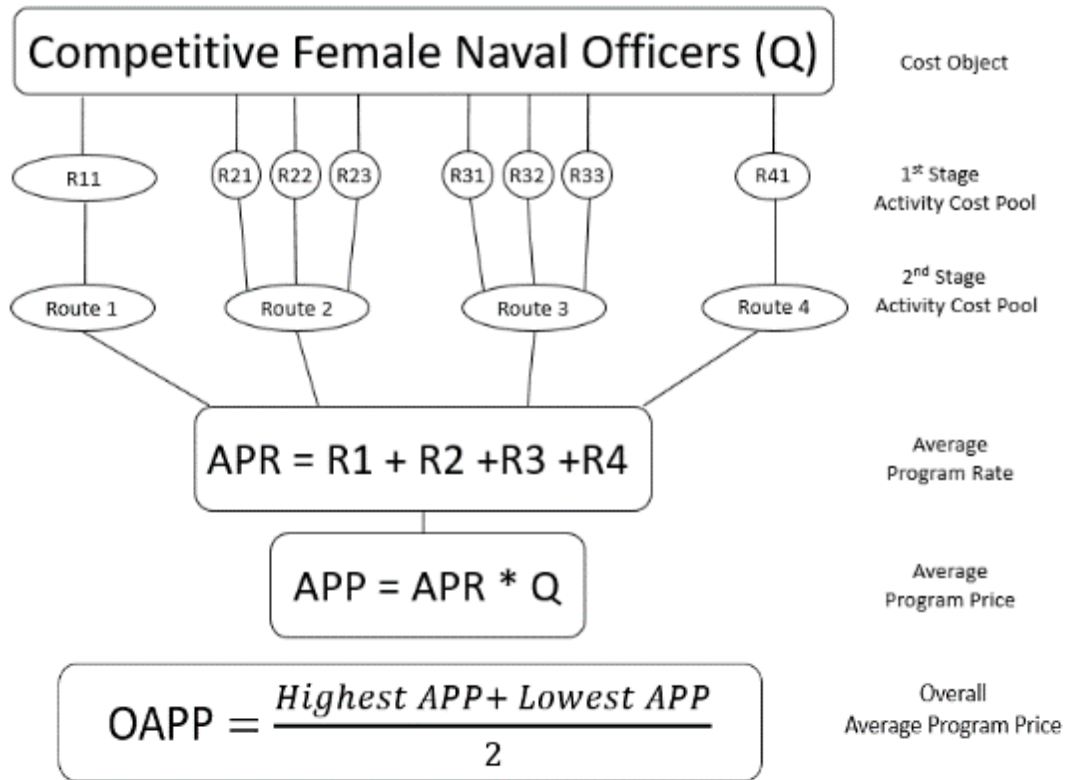


Figure 6. Two-Stage Modified ABC Research Model. Adapted from Brewer et al. (2015, p. 294).

The research model is explained in Tables 5, 6, and 7:

Table 5. Routes and Activity Cost Pools of the Research Model

Routes	Activity Cost Pools
R1	Route 1 (IVF & ICSI to Fertility)
R11	IVF+ICSI A, B, C2, D, E, F
R2	Route 2 (Egg Preservation to Fertility)
R21	Egg Cryopreservation A, B, B1
R22	Storage B2
R23	Egg Thaw to Embryo Transfer B3, C2, D, E, F
R3	Route 3 (Embryo Preservation to Fertility)
R31	Embryo Cryopreservation D1
R31	Storage D2
R33	Frozen Embryo Transfer (FET) D3, E, F
R4	Route 4 (IUI to Fertility)
R41	IUI W, X, Y, Z

Table 6. Activities within the Research Model Routes

Steps	Activities
A	Stimulation of Ovaries
B	Egg Retrieval
B1	Egg Freezing
B2	Egg Storage
B3	Egg Thaw
C1	Fertilization- No ICSI
C2	Fertilization-With ICSI
D	Embryo Culture
D1	Embryo Freezing
D2	Embryo Storage
D3	Embryo Thaw
E	Embryo Transfer
F	Pregnancy Test and Results
W	Sperm Collection
X	Sperm Processing
Y	Insemination in Woman
Z	Pregnancy Test and Results

Table 7. Definitions of Research Model

Terms	Definitions	Units
Cost Object	Competitive Female Naval Officers. Female officers who have screened for their most current community milestone within the 5 unrestricted line (URL) communities: SWO, Nuclear (Surface and Sub), Aviation, EOD, and Naval Special Warfare. Measurement: servicewomen	N/A
Q	Number of program participants, Competitive Female Naval Officers	Women
Activity Cost Pools	A group of activities with a given fertility assistance procedure and the associated cost per fertility cycle. A cycle is defined as the completion of activities within a fertility assistance procedure.	\$/cycle (FY19)
Routes	The sequence, or combination, of activity cost pools, that a servicewomen can undergo to achieve fertility and measure by the sum of the activity cost pools of that sequence per cycle.	\$/cycle (FY19)
Average Program Rate (APR)	The price per servicewomen in obtaining at least one cycle of all fertility assistance routes and measured by the sum of all fertility assistance routes times one cycle from start to finish.	\$/woman (FY19)
Average Program Price (APP)	Average program price per MTF for the proposed EF/IVF pilot program.	\$ (FY19)
Lowest APP	Average program price of the MTF with the lowest APP	\$ (FY19)
Highest APP	Average program price of the MTF with the highest APP	\$ (FY19)
Overall Average Program Price (OAPP)	Estimated average price for implementing the proposed EF/IVF pilot program. Calculated by taking an average of the APP calculated for the model MTFs.	\$ (FY19)

The research model begins with the cost object (Q), which are competitive female naval officers who will consume the resources necessary within fertility treatment procedures, known as activities. Cost objects are measured in terms of the number of program participants, servicewomen, for the potential EF/IVF pilot program.

The next two stages are the first and second stages of activity cost pools. Activity cost pools are a group of activities within a given medical procedure and its associated cost. Fertility assistance activities makes up a medical procedure. Each procedure is classified as a first stage activity cost pool. Each route, or second stage activity cost pool, is composed of the first stage activity cost pools that performed in sequence that would enable a servicewoman to achieve fertility if the procedure cycle is successful. A procedure cycle is the completion of a fertility procedure by a woman. The first and second stage activity cost pools are measured in terms of price per cycle.

The proposed EF/IVF program considered the following routes to aid servicewomen in achieving fertility as part of a retention tool for competitive female naval officers wanting to have a family:

- Route 1 (R1): In vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) to Fertility
- Route 2 (R2): Egg Preservation to Fertility
- Route 3 (R3): Embryo Preservation to Fertility
- Route 4 (R4): Intrauterine insemination (IUI) to Fertility

Routes 1, 2, and 3 utilizes the IVF procedural process as depicted in Figure 7; and route 4 utilizes the IUI procedural process are depicted in Figure 8.

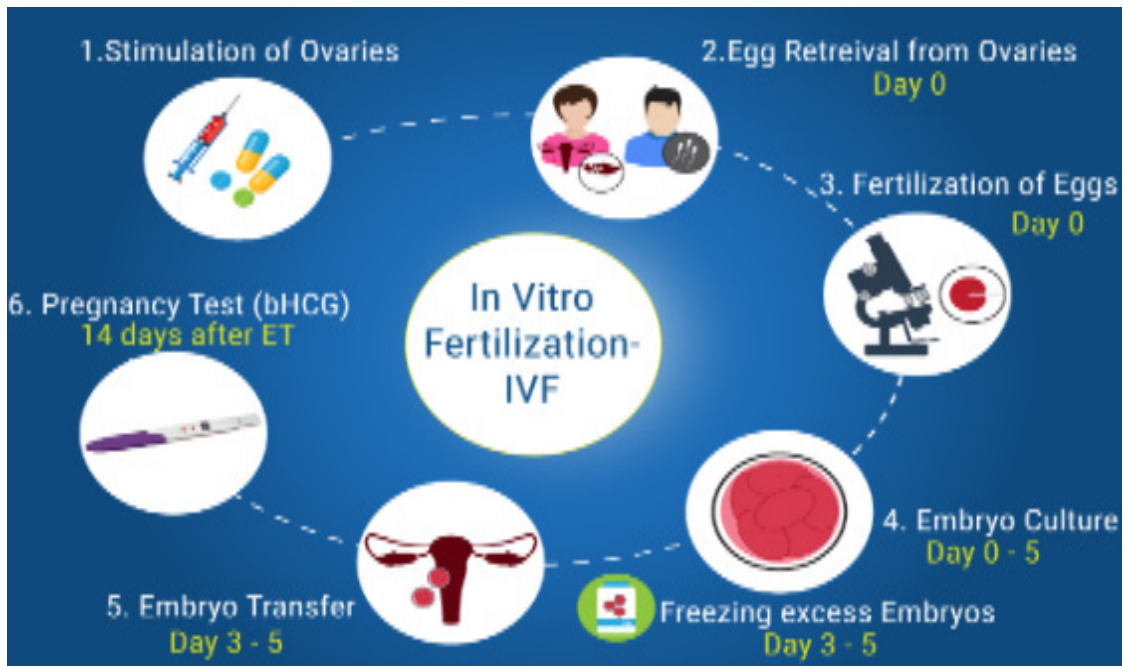


Figure 7. In Vitro Fertilization (IVF) Process. Source: CHL Indore Infertility Clinic (n.d-a).

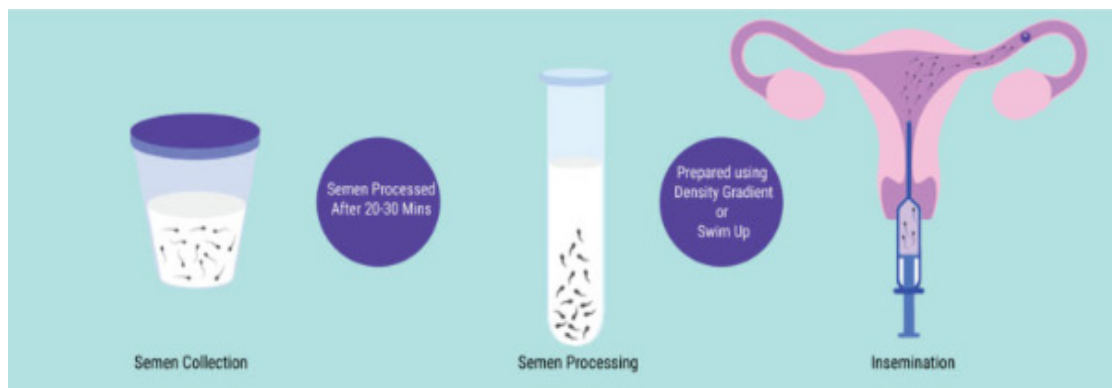


Figure 8. Intrauterine Insemination (IUI) Process. Source: CHL Indore Infertility Clinic (n.d-b).

Route 1 (IVF and ICSI to Fertility) consists of a woman undergoing in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) to potentially achieve fertility. IVF is a fertility assistance procedure in which eggs are fertilized outside a woman's body in a lab and viable embryos that are created are transferred back into the

woman's body. With medical prerequisites met, IVF commences with the woman taking medication to stimulate her ovaries (A). After a period of time, eggs are retrieved from her body (B) and combined with sperm in a lab to fertilize (C1). Fertilized eggs are monitored to see which ones develop into embryos (D). Viable embryo(s) are then transferred into the woman's body (E). Excess embryos can be frozen and stored for future use if necessary. Two weeks later, the woman takes a pregnancy test (F).

ICSI is a special procedure that occurs within the fertilization stage of IVF in which a single sperm is directly injected into an egg (C2) to increase the chances of successful fertility. Fertilization without ICSI is the conventional method in which multiple sperm and multiple eggs are combined in a lab to interact and potentially achieve fertility. Fertilization with ICSI treatment is the most severe case of fertility treatment required due to the male-related infertility factors (CDC, 2019). For the purpose of this research, we assume the most severe case in fertilization with ICSI (C2) is required. Route 1 is depicted in Figure 9.

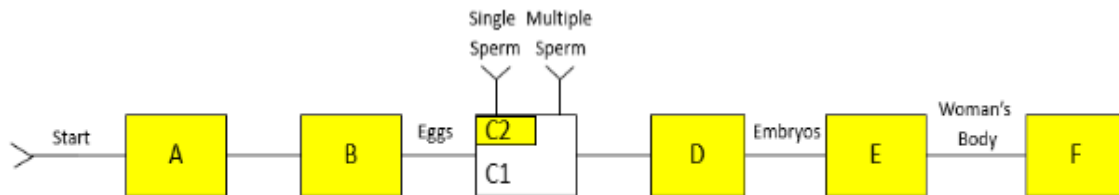


Figure 9. Route 1: IVF & ICSI to Fertility

Route 2 (Egg Preservation to Fertility) is when a woman chooses to delay family starting and preserve fertility by freezing her eggs. This process begins with IVF to retrieve the eggs (A to B), yet off ramps the IVF process by undergoing egg freezing (B1) and storage of the frozen eggs (B2). When the woman is ready to commence the fertility process, her eggs are removed from storage and thawed (B3), and then she continues the remainder of the IVF cycle to potentially achieve fertility (C2 to F). Route 2 is depicted as follows in Figure 10.

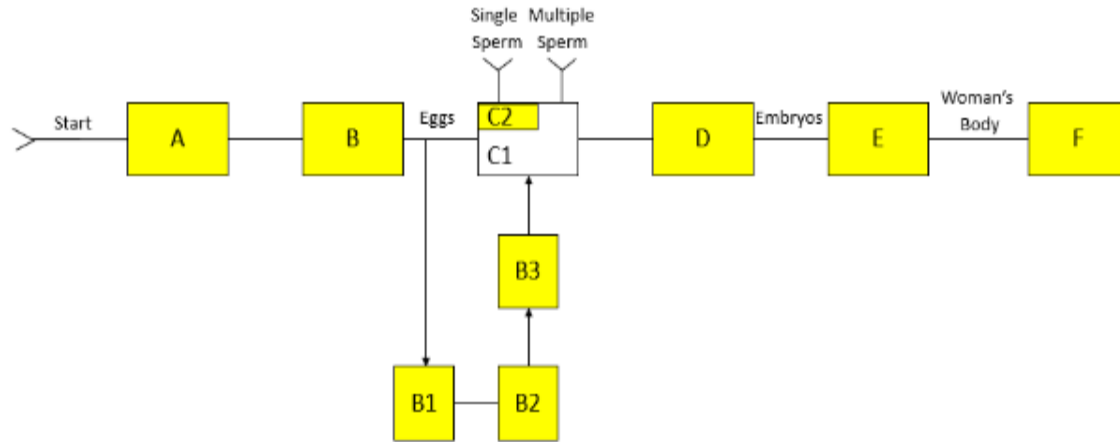


Figure 10. Route 2: Egg Preservation to Fertility

Route 3 (Embryo Preservation to Fertility) is when a woman has already undergone the previous step of IVF (A to D) and chooses to preserve some of the excess viable embryos. This is beneficial in cases where fertility is not achieved in a previous IVF cycle. The woman needs not recommence the entire IVF process, which saves time and money for repeated fertility attempts. In this process, excess embryos are frozen (D1) and stored (D2). When the woman is ready to attempt fertility again, she would undergo frozen embryo transfer (FET), in which the embryos is thawed (D3), the embryo is transferred into the woman's body (E), and completes the process with a pregnancy test (F). Route 3 is depicted in Figure 11.

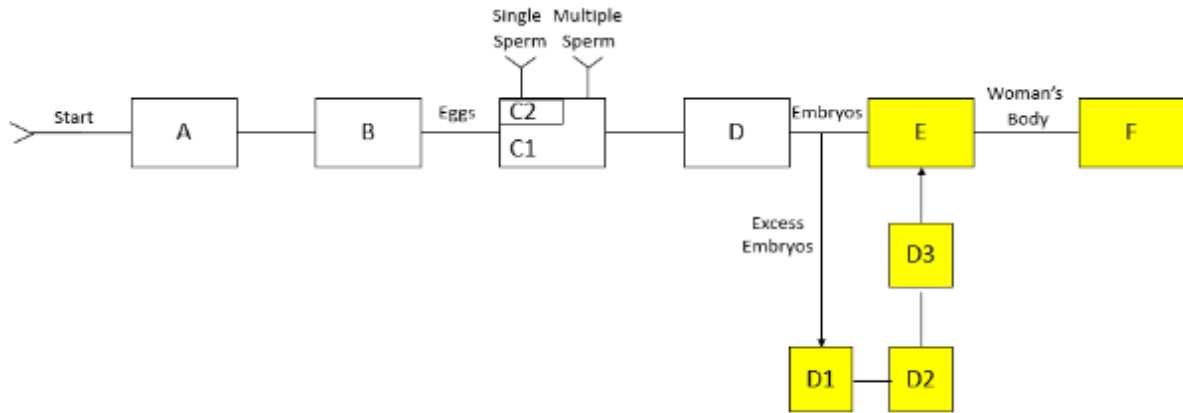


Figure 11. Route 3: Embryo Preservation to Fertility

Route 4 (IUI to Fertility), intrauterine insemination (IUI), also called artificial insemination, is a non-assisted reproductive technology (ART) procedure and is separate from IVF. In IUI, sperm is collected from the male, processed and washed in a lab, and then directly inserted into the woman's body. IUI is the least invasive fertility treatment procedure and is normally attempted prior to IVF. It is predominantly used in cases of male-related infertility factors. Route 4 cycle is depicted in Figure 12.

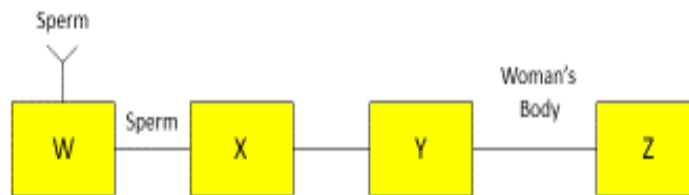


Figure 12. Route 4: IUI to Fertility

The research price estimation uses the summation of the routes to determine the average program rate (APR). APR is the average price that would be paid to sufficiently cover a servicewoman to receive at least one cycle of all four fertility assistance routes suggested within the proposed EF/IVF pilot program. While all program participants might not need the four routes to achieve fertility, this ensures that the combined costs for the

most extreme case of infertility is covered. As such, the APR is calculated by taking a sum of the second stage activity cost pool rates (price per cycle) and multiplying it by one cycle per women. This results in the following equation and units for APR:

$$\text{APR} = \frac{(\text{R1} + \text{R2} + \text{R3} + \text{R4})}{(\$ / \text{cycle})} * \frac{(1)}{(\text{cycle} / \text{woman})}$$

(\$/woman)

where

Route 1 (R1): IVF and ICSI to Fertility consist of IVF and ICSI activity cost pools (R11)

$$\text{R1} = \text{R11}$$

Route 2 (R2): Egg Preservation to Fertility consist of egg cryopreservation (R21), storage (R22), and egg thaw to embryo transfer (R23) activity cost pools

$$\text{R2} = \text{R21} + \text{R22} + \text{R23}$$

Route 3 (R3): Embryo Preservation to Fertility consist of embryo cryopreservation (R31), storage (R32), and FET (R33) activity cost pools

$$\text{R3} = \text{R31} + \text{R32} + \text{R33}$$

Route 4 (R4): IUI to Fertility consist of the sole IUI activity cost pool (R41)

$$\text{R4} = \text{R41}$$

Upon computing the APR, the average program price per MTF (APP) is determined. APP is computed by multiplying the APR by the number of program participants (Q) receiving treatment at the MTF and is measured in terms of price per MTF. This yields the following equation and units for APP:

$$\text{APP} = \text{APR} * \text{Q}$$

(\$ / (\$ /woman) (women))

Furthermore, the estimated price range (Range) for the proposed EF/IVF pilot program will be determined by setting the lowest APP of the two MTFs as the lower limit, and setting the highest APP as the upper limit. This will provide a range and associated units as follows:

$$\text{Range: } \begin{array}{ccc} \text{Lowest APP} & \text{to} & \text{Highest APP} \\ (\$) & & (\$) \end{array}$$

Finally, the overall average program price (OAPP) for the proposed EF/IVF pilot program will be determined by taking an average of the APP of the two MTFs. OAPP computed with the units as follows:

$$\text{OAPP} = \frac{\text{Highest APP} + \text{Lowest APP}}{2}$$

(\\$) \hspace{10em} (\\$)

where

OAPP: Overall average program price for the proposed EF/IVF pilot program
 Lowest APP: Average program price of the MTF with the lowest APP
 Highest APP: Average program price of the MTF with the highest APP

3. Research Model Assumptions

The following assumptions were made within the research ABC model and subsequent calculations:

a. *Cost Object (Q)*

Program participants are competitive female naval officers, and units are servicewomen. All servicewomen within this group are treated as the same. No differentiation is made on age, medical history, time in service, job requirements, or any other factors. The proposed number of program participants is 25. This provides a representative sample for the pilot program, allocating on average five program slots per URL community of the competitive female naval officers.

Q = 25 servicewoman

b. Activity Cost Pools

Activity cost pools are defined based on the services and associated price package for fertility assistance procedures provided by the model's baseline MTFs, WRNMMC and TAMC. For the purpose of computations, the following adjustments were made to mirror the fertility processes between the two baseline MTFs:

- WRNMMC Embryo Cryopreservation (R31):

Excess embryo freezing is normally included within the IVF procedure at WR. To make embryo cryopreservation a stand-alone activity cost pool, the price for IVF-with ICSI was reduced by the price for embryo vitrification and set embryo cryopreservation equal to the price of embryo vitrification:

- IVF with ICSI for Research Model = IVF with ICSI – Embryo Vitrification
- Embryo Cryopreservation for Research Model = Embryo Vitrification

- TAMC Egg Thaw to Embryo Transfer (R23):

Upon egg freezing and storage, the following process to achieve fertility is the same cost as a full IVF cycle. Therefore, the price for egg thaw to embryo transfer is set equal to IVF with ICSI:

- Egg Thaw to Embryo Transfer for Research Model = IVF with ICSI

- WRNMMC and TAMC Storage for Frozen Eggs and Embryos (R22 and R31):

Annual storage rates for frozen eggs and embryos are the same at each respective MTF, and are based on a non-standardized batch size of viable eggs or embryos retrieved. To determine storage price, annual storage rate is multiplied by five years. Five years is based on two nominal back-to-back sea duties of two years each, plus one additional year in cases of delay in transferring from sea duty to shore duty. This would give competitive female naval officers flexibility during sea duty in preserving fertility assistance until shore duty is available.

- Storage = Annual MTF storage rate * 5 years

c. Routes and Cycles

Proposed in the EF/IVF pilot program are the following: at least one cycle of IVF with ICSI (Route 1), egg preservation to fertility (Route 2), embryo preservation to fertility

route (Route 3), and IUI (Route 4). Every servicewoman may all of these procedure to obtain fertility. However, providing this combination of fertility assistances ensure sufficient funding coverage of the pilot program funding to ensure the individual service member can obtain the fertility plan customized to fit her career and medical constraints. This results in a higher average program price than needed, yet also provided competitive female naval officers career flexible to commence family starting immediately (Route 1 or 4), preserve for later (Route 2), or repeat if previous attempt is successful (Route 3). Effectively, each servicewoman would receive a total of four cycles of fertility assistance within the proposed EF/IVF pilot program.

4. Research Model Computations

The price estimate computations for the study are provided below in Table 8:

Table 8. Price Estimate Computations for the Proposed EF/IVF Pilot Program

Routes	Activity Cost Pools		Per woman:	
			Price per cycle (\$ / cycle)	
			WRNMMC	TAMC
R1	Route 1 (IVF & ICSI to Fertility)			
R11	IVF+ICSI	A, B, C2, D, E, F	\$ 6,670.00	\$ 5,759.16
	Total R1		\$ 6,670.00	\$ 5,759.16
R2	Route 2 (Egg Preservation to Fertility)			
R21	Egg Cryopreservation	A,B, B1	\$ 4,249.00	\$ 4,929.11
R22	Storage	B2	\$ 2,030.00	\$ 7,853.40
R23	Egg Thaw to Embryo Transfer	B3, C2, D, E, F	\$ 7,821.50	\$ 5,759.16
	Total R2		\$ 14,100.50	\$ 18,541.67
R3	Route 3 (Embryo Preservation to Fertility)			
R31	Embryo Cryopreservation	D1	\$ 636.00	\$ 1,570.00
R31	Storage	D2	\$ 2,030.00	\$ 7,853.40
R33	Frozen Embryo Transfer (FET)	D3, E, F	\$ 3,642.00	\$ 1,884.82
	Total R3		\$ 6,308.00	\$ 11,308.22
R4	Route 4 (IUI to Fertility)			
R41	IUI	W, X, Y, Z	\$ 2,027.00	\$ 233.30
	Total R4		\$ 2,027.00	\$ 233.30
APR	Average Program Rate (\$/woman)	(R1 + R2 +R3 + R4)* 1 cycle/woman	\$ 29,105.50	\$ 35,842.35
	*			
Q	Number of Program Participants (women)		25	25
APP	Average Program Price (\$)	APR*Q	\$ 727,637.50	\$ 896,058.75
Range	Range of APP (\$):			
	Upper Limit (TAMC)	\$ 896,058.75		
	Lower Limit (WRNMMC)	\$ 727,637.50		
OAPP	Overall Average Program Price (\$)	(APP Upper Limit + APP Lower Limit) / 2		
		\$ 811,848.13		

The results from the research model computations are described as follows:

Route 1 (IVF and ICSI to Fertility) demonstrates the fertility assistance sequence of a woman attempting to achieve fertility in the immediately future. This price consists of a servicewoman undergoing IVF and ICSI (R11), and the price per cycle of IVF and ICSI

fertility assistance (R1) has been determined to be \$6,670 at WRNMMC and \$5,759.16 at TAMC as shown in Table 8.

Route 1 (R1): IVF and ICSI to Fertility consist of IVF and ICSI activity cost pools (R11).

$$R1 = R11$$

- WRNMMC: $R1 = R11 = \$6,670$ per cycle
- TAMC: $R1 = R11 = \$5,759.16$ per cycle

Route 2 (Egg Preservation to Fertility) demonstrates the fertility assistance sequence when a woman chooses to delay family starting and preserve fertility by freezing her eggs, and the subsequent steps to potentially achieve fertility when ready. This price consists of a servicewoman undergoing egg cryopreservation (R2), storage for the frozen egg (R22), and egg thawing to embryo transfer (R23). The price per cycle for egg preservation to fertility (R2) has been determined to be \$14,100.50 at WRNMMC and \$18,541.67 at TAMC as shown in Table 8.

Route 2 (R2): Egg Preservation to Fertility consist of egg cryopreservation (R21), storage (R22), and egg thaw to embryo transfer (R23) activity cost pools.

$$R2 = R21 + R22 + R23$$

- WRNMMC: $R2 = R21 + R22 + R23$
 $= 4,249.00 + 2,030.00 + 7,821.50$
 $= \$14,100.50$ per cycle
- TAMC: $R2 = R21 + R22 + R23$
 $= 4,929.11 + 7,853.40 + 5,759.16$
 $= \$18,541.67$ per cycle

Route 3 (Embryo Preservation to Fertility) demonstrates the repeated fertility assistance sequence by woman without having to re-start IVF from the beginning. This price consists of a servicewoman undergoing embryo cryopreservation (R31), storage for the frozen embryos (R32), and FET (R33). The price per cycle for embryo preservation to fertility (R3) has been determined to be \$6,308 at WRNMMC and \$11,308.22 at TAMC, as shown in Table 8.

Route 3 (R3): Embryo Preservation to Fertility consist of embryo cryopreservation (R31), storage (R32), and FET (R33) activity cost pools.

$$R3 = R31 + R32 + R33$$

- WRNMMC: $R3 = R31 + R32 + R33$
 $= 636.00 + 2,030.00 + 3,642.00$
 $= \$6,308.00$ per cycle
- TAMC: $R3 = R31 + R32 + R33$
 $= 1,570.00 + 7,853.40 + 1,884.82$
 $= \$11,308.22$ per cycle

Route 4 (IUI to Fertility) demonstrates the least invasive fertility treatment procedure that is used in male-related infertility factors and is normally attempted prior to IVF to attempt achieving fertility. This price consists of a servicewoman undergoing IUI (R41), and the price per cycle of IUI fertility assistance (R4) has been determined to be \$2,027.00 at WRNMMC and \$233.30 at TAMC as shown in Table 8.

Route 4 (R4): IUI to Fertility consist of the sole IUI activity cost pool (R41).

$$R4 = R41$$

- WRNMMC: $R4 = R41 = \$2,027.00$ per cycle
- TAMC: $R4 = R41 = \$233.30$ per cycle

The average program rate (APR) demonstrates the average price that would be paid to sufficiently cover a servicewoman to receive at least one cycle of all four fertility assistance routes suggested in the proposed EF/IVF pilot program. The APR has been determined to be \$29,105.50 per woman at WRNMMC and \$35,842.25 per woman at TAMC as shown in Table 8.

$$\begin{array}{ccccc} \text{APR} & = & (R1 + R2 + R3 + R4) & * & (1) \\ (\$/\text{woman}) & & (\$/\text{cycle}) & & (\text{cycle}/\text{woman}) \end{array}$$

- WRNMMC: $\text{APR} = (R1 + R2 + R3 + R4) (\$/\text{cycle}) * (1 \text{ cycle}/\text{woman})$
 $= (6,670.00 + 14,100.50 + 6,308.00 + 2,027.00) * (1)$

$$= \$29,105.50 / \text{woman}$$

- TAMC: $\text{APR} = (R1 + R2 + R3 + R4) (\$/\text{cycle}) * (1 \text{ cycle}/\text{woman})$
 $= (5,759.16 + 18,541.67 + 11,308.22 + 233.30) * (1)$
 $= \$35,842.25 / \text{woman}$

The average program price per MTF (APP) demonstrates the estimated average price of the proposed EF/IVF pilot program for 25 program participants (Q) at an MTF. The APP has been determined to be \$727,637.50 at WRNMMC and \$896,058.75 at TAMC as shown in Table 8.

$$\begin{array}{ccccc} \text{APP} & = & \text{APR} & * & Q \\ (\$) & & (\$/\text{woman}) & & (\text{woman}) \end{array}$$

- WRNMMC: $\text{APP} = \text{APR} (\$/\text{woman}) * Q (\text{woman})$
 $= \$29,105.50 / \text{woman} * 25 \text{ women}$
 $= \$727,637.50$
- TAMC: $\text{APP} = \text{APR} (\$/\text{woman}) * Q (\text{woman})$
 $= \$35,842.25 / \text{woman} * 25 \text{ women}$
 $= \$896,058.75$

The estimated price range for the proposed EF/IVF pilot program demonstrates the highest and lowest estimated average program price for the proposed EF/IVF pilot program. The range has been determined to be between \$727,637.50 to \$896,058.75 as shown in Table 8.

$$\begin{array}{ccccc} \text{Range:} & \text{Lowest APP} & \text{to} & \text{Highest APP} & \\ & \$727,637.50 & \text{to} & \$896,058.75 & \\ & (\text{WRNMMC}) & & (\text{TAMC}) & \end{array}$$

Finally, the overall average program price (OAPP) demonstrates the average price to implement the proposed EF/IVF pilot program and has been determined by taking an average of the two MTFs APP as follows:

$$\begin{aligned}
\text{OAPP} &= \frac{\text{Highest APP} + \text{Lowest APP}}{2} \\
&= \frac{\$727,637.50 \text{ to } \$896,058.75}{2} \\
&= \$ 811,848.13
\end{aligned}$$

D. CONCLUSION

The ethical perspective provided justification for implementing the proposed EF/IVF pilot program, and the financial perspective computed the average price in implementing the program. In the final chapter, the researchers will provide recommendations for decision-makers in implementing the proposed EF/IVF pilot program based on the research ethical and financial analysis.

V. CONCLUSION, RECOMMENDATIONS, AND FUTURE RESEARCH

A. CONCLUSION

Senior naval leadership has emphasized that the Navy values and benefits from the diversity and inclusion of servicewomen. While the Navy has made substantial advancement in the recruitment of servicewomen, this research discovered a drop in the seasoned female officer population. Navy sponsored surveys in 2016 and 2018 have shown the leading influencers for female officers leaving the Navy relates to career impact on family and personal life, primarily the ability to have a family. The ability to have a family consists of planning, starting, and supporting a family. Starting a family poses a significant challenge to hard-charging competitive female naval officers who seek to maintain a work-life balance between serving their country and their desire to have a family. The researchers have shown that by considering the proposed research frameworks to implement EF/IVF as a retention tool, this can lead to increased retention of competitive servicewomen by providing an adequate work-life balance. Furthermore, increased retention of competitive servicewomen can create a more diverse, inclusive, and stronger senior leadership overall for the Department of Defense.

The Navy has utilized various retention tools to retain competitive naval officers. However, the current retention alternatives do not directly address the main reason why many female officers are leaving the Navy, resulting in a retention drop in the seasoned female officer population. Therefore, this research explored an additional retention tool that could directly address one of the primary retention influencers, as cited in Navy-sponsored surveys: ability to have a family.

This research utilized a qualitative and quantitative approach to assess implementing a potential EF/IVF pilot program as an additional retention tool: an ethical and financial perspective. The ethical perspective justified why such a program should be implemented using the ethical theoretical frameworks of equality, equity, and need. The financial perspective supported the ethical perspective by demonstrating the cost of implementing a proposed EF/IVF pilot program. The price estimation was calculated using

the ABC theoretical framework and methodology and provided in the previous analyses chapter.

B. RECOMMENDATIONS

In this study, the researchers reviewed current retention tools and researched evidence and data in order to support a possible recommendation for the Navy to implement the use of EF/IVF as an additional retention tool for competitive female officers in the URL communities. Based on this research, the researchers provide the following recommendations for naval and DoD leadership:

- Consider implementing the proposed EF/IVF pilot program as an additional retention tool for competitive female naval officers.
- Establish an enabling environment that supports the proposed EF/IVF pilot program.
- Assess the parameters and effectiveness of the proposed EF/IVF pilot program on future retention trends for competitive female naval officer, and consider program expansion if effective.

C. RESEARCH LIMITATIONS AND FUTURE RESEARCH

This study was intended to address a known decline in Navy women's retention at the seasoned officer levels of O-4 to O-6 paygrades; however, a few limitations became evident during the research. First, data demographic trends for the O-4 to O-6 seasoned female officer population shows a decline since 2014; however, qualitative evidence on the exact reason for this decline remains unknown. In addition, this study was designed to uncover the average cost of a woman undergoing fertility treatment from initiation until conception at MTFs, which were to be factored into a proposed average pilot program cost. During the study, it has been identified that current price data from all six MTFs that provide fertility assistance are not segregated based on the direct and indirect cost, and administrative cost. This created challenges in performing a standard cost estimation. As a result, an average price estimation was performed. Finally, the purpose of this study was to identify a talented woman's limited ability to start a family while pursuing career

progression in the Navy. However, there has not been a comprehensive health study performed on DoD servicewomen since the 1980s. This created an inability to determine the scope of naval servicewoman who are affected by infertility. Although a gender-specific study on women's infertility while serving in the military has never been conducted, a future RAND study will be released in late 2019 addressing infertility among DoD servicewomen.

Based on this study, future research and exploration in the following areas is recommended:

- Obtain specific URL data on the retention of seasoned female officers.
- Obtain direct and indirect costs for all six MTFs to provide a statistically significant cost estimate.
- Study the actual number and percentages of servicewomen affected by infertility in the Navy.

Women have made tremendous contributions to the nation's fight and continue to maintain a warfighting spirit. The extraordinary sacrifice servicewomen have made to this country has remained undeniable; however, the compromise of career for family-starting is a roadblock many women face that results in their decisions to leave the Navy. The policy alternative of utilizing EF/IVF as a retention tool reflects the fundamental reason why many women are leaving the Navy. In attempts to develop senior leadership in the Navy that reflect an effective percentage of men and women, retention tools that enable an environment of family-starting needs to be provided. This study provides an ethical and financial assessment intended for the utilization of EF/IVF as a retention tool. Providing an enabling environment for hard-charging female talent to start a family provides a work-life balance comparable to that of civilian industries and preserves the best of America's invaluable resources: its women and men.

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