

- Evelyn Lamb: [00:10](#) Hello and welcome to the Lathisms podcast. I'm your host, Evelyn Lamb. In each episode we invite a Hipanic or Latinx mathematician to share their journey in mathematics. Today I'm very pleased to welcome Omayra Ortega to the show. I'm really glad you could be here.
- Omayra Y Ortega: [00:27](#) Hi. I'm glad to be here as well. Thank you for inviting me, Evelyn.
- Evelyn Lamb: [00:32](#) Can you tell us a little bit about yourself, where you're based, that kind of thing.
- Omayra Y Ortega: [00:37](#) I'm currently at Sonoma State University and this is in Northern California in Rohnert Park in the bay area. I just started my position here. I've been here just a little over a month, but I've been in academia for a while. I was previously a visiting professor at Pomona College for one year and then before that I was actually in industry for a little while. I worked as a healthcare consultant for a while doing statistical analysis for state departments of health here in the United States. Even prior to that, where I started my academic career, was at Arizona State University where I was for nine years.
- Evelyn Lamb: [01:21](#) Going back to childhood, did you grow up knowing that you wanted to be a mathematician?
- Omayra Y Ortega: [01:26](#) No. When I was younger I wanted to be a nun.
- Evelyn Lamb: [01:31](#) Wow, that's a big difference.
- Omayra Y Ortega: [01:32](#) Yeah. I really liked the idea of having quiet spaces, to just be lost in your thoughts and read whatever you wanted to do on your own, but clearly that's not the path that I took as my career progressed, as my life progressed. But no, I didn't always want to be a mathematician. I would say I wasn't even really sure that I wanted to study math until I got to college.
- Evelyn Lamb: [02:00](#) In college, what made you make that decision?
- Omayra Y Ortega: [02:05](#) I'm actually not 100% sure of how I decided on the math major, but I knew that I wanted to be a math and music major. Truthfully, initially when I started college I was pre-med and I really thought that I would continue on to medical school. I think that I heard somewhere that medical schools really love to accept mathematicians and so that really was probably one of the biggest reasons why I chose math, although I did always enjoy math also. So, I picked a subject that I knew would help

me if I went on to medical school and to get into medical school, but I also chose a field that I enjoyed.

Evelyn Lamb: [02:41](#) What music field or instrument or voice did you do in school?

Omayra Y Ortega: [02:47](#) Throughout pretty much my whole life I have sung. I think in middle school I started playing the glockenspiel in a marching band. From there I went to high school and I started playing the drum set and then orchestral percussion as well. In college my major was voice performance and percussion performance.

Evelyn Lamb: [03:11](#) Wow. It seems like maybe you felt pulled in several directions in college.

Omayra Y Ortega: [03:18](#) Oh, absolutely. I will say though as I continued on towards the end of my undergraduate career at Pomona College, I started to realize there are a lot of musicians, in particular there's a lot of musicians of color and I felt like my life would have more impact as a mathematician of color.

Evelyn Lamb: [03:40](#) Wanting to be able to be a role model for younger mathematicians coming through?

Omayra Y Ortega: [03:47](#) Exactly. I wanted to be counted. As a mathematician we count things all day and as a statistician you know those statistics matter and so I wanted to be a statistic.

Evelyn Lamb: [03:59](#) In college, were you encouraged to pursue the math major and go on to higher education in math and statistics?

Omayra Y Ortega: [04:07](#) There was sort of a mixture of being encouraged and being discouraged during college. I will say my first year in college I had a lot of fun and the fun didn't necessarily translate into getting good grades. I had a lot of challenges my first year and when I went back for my sophomore year I had a faculty member encourage me to drop the math major. The rationale was that, "Math is hard. Maybe you should drop the math major." I was like, "Why would I drop a major that I'm actually motivated to complete?"

Omayra Y Ortega: [04:43](#) I clearly didn't take that advice, but I did take the advice of some other faculty members who were very excited to have me as a math major and even encouraged me in different points along my career. Further on when I was a junior there was a point when I almost dropped out to move to Las Vegas and be a lounge singer but then I had a faculty member find me a job teaching math over the summer with The Center for Talented

Youth, so I continued studying math instead. There has been a lot of different occasions when I have been discouraged and there have been a lot of different occasions when I've been encouraged to study mathematics.

Omayra Y Ortega: [05:28](#) I will also say there was another turning point when I was encouraged to go on to grad school. I participated in a REU program, a research experience for undergraduates, where I learned more about the different fields available in mathematics, so the different specializations that existed, but also that you could become a professor in mathematics, and that's a career too. There's not only math teachers or ... I can't even really think of what my other options were at that point really. You really only hear about the option of being a math teacher so I was excited to be a math professor and to go on to grad school and get a PhD and be a doctor.

Evelyn Lamb: [06:12](#) Were you able to find role models in terms of other women, especially women of color, to kind of help you along that path?

Omayra Y Ortega: [06:24](#) I have found so many role models, honestly. As I was telling those stories just about moments of encouragement and discouragement, I was actually thinking about specific people. I will say in my early career I didn't have any female role models of color. I would say the first female role model in mathematics that I had that was a person of color would have been Dr. Sylvia Bozeman and I didn't meet her until I had already been accepted into grad school and I did a summer program with her called the EDGE program, it's Enriching Diversity in Graduate Education. She was the first woman of color that I had met that had a doctorate in mathematics.

Omayra Y Ortega: [07:11](#) But I had a lot of role models, as I said. I really have to show them some love. In particular Dr. Ami Radunskaya who was one of my professors at Pomona College. Even to this day she still keeps track of me, checks up on me, makes sure that I'm doing okay. She actually facilitated my return to academia. I really appreciate all of her mentorship and advice.

Omayra Y Ortega: [07:41](#) That moment that I was talking about when I almost moved to Vegas, Dr. Erica Flapan was another one of my professors at Pomona who when I told her the story, my plan for the summer, she just thought it was the most ridiculous thing in the world. She's the one who suggested and found this job teaching at The Center for Talented Youth, their location at Loyola Marymount. Both of these women have been instrumental in my career path and in my success as a mathematician.

- Omayra Y Ortega: [08:11](#) I have to say one last mentor that I've had is Dr. Carlos Castillo-Chavez. I had sort of alluded to him a little bit in the story about the REU program where I learned that you could become a professor in mathematics, but I also learned about these other sub-disciplines within mathematics. In particular I learned about mathematical epidemiology, which is my field now, and so I just learned that I could combine my love of the medical field with my love of mathematics into one career as a mathematical epidemiologist. That was a revelation for me. As I said earlier, I was pre-med initially when I started college so it was really refreshing to know that I didn't need to work in the medical field or work as a mathematician, they weren't exclusive.
- Evelyn Lamb: [09:04](#) That's so great that you mentioned him because he is the first person that we had in this podcast series. We talked about the REU project that he's done, so yeah it's really nice to hear from someone who went through that project too.
- Omayra Y Ortega: [09:19](#) Yeah. It's such an important program. They do such important work and they've had such an effect on the United States as a whole, just the whole landscape of who is a mathematician in the United States. He's starting to broaden his impact around the world as well. But I was also really blessed to be the director of that program, I believe in 2012 was the year, either 2012 or 2014, I'd have to look back at my CV to remember exactly. That was a really wonderful experience to go back and be able to lead students in research and guide these students who were in exactly the same position that I was in X amount of years ago, I'm not going to say exactly because then you'll figure out my age.
- Evelyn Lamb: [10:03](#) You mentioned that you work in mathematical epidemiology. Can you give us an idea of some of the questions that you work on.
- Omayra Y Ortega: [10:15](#) I work on a lot of different types of problems, especially because of the different types of jobs that I've had throughout my career. I use different tools for mathematics and statistics to solve problems in public health and in epidemiology. For instance, looking at the rotavirus disease. It's a disease that affects infants mainly but can also affect young children. It can kill young children and essentially the results are it's just extreme dehydration.
- Omayra Y Ortega: [10:49](#) My research would look at the spread of this disease and then try to model the spread with differential equations. Also there is some statistics that is used as well, not necessarily statistical

modeling but using statistics to estimate parameters and using these parameters in your mathematical models. You use these mathematical models to make predictions about what's going to happen with the disease over time if you, say, introduce one type of preventative measure. If you improve water quality, how will that change the course of the disease? If you improve education to young mothers to teach them, you need to give your child re-hydration salts so that they can become hydrated again and be more adept at fighting this disease.

Omayra Y Ortega: [11:45](#) You can compare these different preventative strategies with a mathematical model and it ends up being cost-saving because if you were to actually deploy these prevention strategies into the population, into the world, that would cost a lot. Having a mathematical model is a way to still carry out this sort of experiment or this experimental preventative strategy without actually having to involve human subjects.

Evelyn Lamb: [12:16](#) Okay, so this is mostly like simulated human subjects on a computer?

Omayra Y Ortega: [12:22](#) Absolutely. Yeah. I don't really do any field work, I'm a computer person and pen and paper, so everything would be computer models, simulated, generally using MATLAB as my most favorite piece of software. Just trying to predict what's going to happen.

Omayra Y Ortega: [12:45](#) I had the fortune during grad school to spend some time in Egypt working with the Ministry of Health there. They were actually interested in the work that I was doing on rotavirus but they wanted to evaluate the vaccine, the rotavirus vaccine. This was back in 2002 when the vaccine was still brand new. Trying to figure out if they could afford it, trying to figure out if it would be effective for their specific population.

Omayra Y Ortega: [13:11](#) That was also an eye-opening experience for me as well because often times we create these parameter estimates just based on averages, just population averages, but models should be created for the specific population that they're going to be applied to and in that way the parameters actually reflect the population. For example, at the time most of the rotavirus models were specific to the United States and so recovery rates in the United States or even life expectancy in the United States is quite different from the recovery rates and the life expectancy in Egypt. It's just little things like that. It was sort of like personalized healthcare for the country of Egypt.

- Evelyn Lamb: [13:59](#) Can you tell us a little bit about the work that you did in between your academic jobs.
- Omayra Y Ortega: [14:03](#) Mm-hmm (affirmative). I will say working at this private company, they were very intrigued in my math models but they made no pretense that I would be doing mathematical modeling for them. What I did there mostly was statistical modeling. They were interested in different types of regression or generally just statistical analysis and there was definitely a lot of data science-y type stuff where you're getting all of this data from state medical departments, or state departments of Medicaid specifically are the offices that I would work with.
- Omayra Y Ortega: [14:46](#) This is entire population-level data that you need to run analyses on. At that point in my career, it was sort of a combination of statistics and data science. A lot of it truthfully I had to learn on the job because my training was mainly in differential equations and applications of differential equations.
- Omayra Y Ortega: [15:09](#) I did really enjoy the work that I did there because everything that I produced, everything that I wrote, everything that I analyzed and all of my results were used immediately. They immediately went back to the client, they immediately went back to these departments of health across the country. I did really enjoy working there.
- Evelyn Lamb: [15:31](#) A little different timeline than academic publication I guess.
- Omayra Y Ortega: [15:35](#) Oh my gosh yeah. Oh my gosh. I think my first publication took two years of back and forth with the editors before it was published versus in the private sector, it was instantaneous. It's sort of ... You are the ultimate editor. You have a team of editors, but your final product goes directly to the client.
- Evelyn Lamb: [16:04](#) Finally, what are your thoughts on Hispanic Heritage Month?
- Omayra Y Ortega: [16:09](#) I think it's great. I think it's a great month. I'm very happy that we have Hispanic Heritage Month. I actually in preparation, I know that this podcast is partially in celebration for Hispanic Heritage Month and I was reading sort of why these dates were chosen. There are a lot of independence days for countries in Central and South America that happen in September and October. In particular on September 15th, there were five different countries that have independence day.
- Omayra Y Ortega: [16:39](#) But I just want to give you guys a fun fact about one of the best countries in Central and South America, this country has two

independence days. This country is Panama, the country that I'm from. Both of their independence days are in November, which actually fall outside of Hispanic Heritage Month. I think that people should focus more Hispanic Heritage Month programming on Panama because I think it's often overlooked and it's a fantastic country.

Evelyn Lamb: [17:10](#) Now I'm so fascinated. Why are there two independence days?

Omayra Y Ortega: [17:16](#) The first one was November 28th like 1820, around then, and that's the independence from Spain. But then November 3rd, I might get this year wrong, I think it's 1903. November 3, 1903 Panama got its independence from Colombia.

Evelyn Lamb: [17:40](#) Okay. I didn't realize it had been under both Spain and Colombia.

Omayra Y Ortega: [17:46](#) Yeah. Actually Colombia had a couple countries for a while, I think Ecuador and Venezuela also.

Evelyn Lamb: [17:54](#) Oh, interesting. I'm learning something ... I mean, I learn something new every time I record one of these.

Omayra Y Ortega: [17:58](#) Nice.

Evelyn Lamb: [17:59](#) Thank you so much for joining me, I really enjoyed talking with you.

Omayra Y Ortega: [18:04](#) Thank you so much, Evelyn. I enjoyed speaking with you also.

Evelyn Lamb: [18:09](#) Thank you for listening to the Lathisms podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor-SUMMA grant from the Mathematical Association of America. Our music is Volvere by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was founded in 2016 by Alexander Diaz-Lopez, Pamela Harris, Alicia Prieto Langarica and Gabriel Sosa.

Evelyn Lamb: [18:36](#) You can find more information about the project at [lathisms.org](http://lathisms.org), that's L-A-T-H-I-S-M-S dot O-R-G.

Evelyn Lamb: [18:44](#) Join us next time to hear from another inspiring mathematician.