CoitoCare

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I. Executive Summary

1. The Main Concept

CoitoCare is an application for sexually active people to provide safety from sexually transmitted disease or infection by logging and backtracking intercourses and sending warnings in the case of present or potential danger while it provides anonymity. People can be safe since the service sends a warning message when a contact reports any disease or when the service detects a possible threat by the user's settings and preferences. CoitoCare helps people to tell their previous sex-partners that they might be infected.

2. Innovation

This idea comes from the lack of contact tracer apps. We provide a unique warning system that calculates the dangerousness not only for the close contacts but for the deeper connections like second or third connections.

3. Effectiveness & Impact

CoitoCare helps people to have better and fearless sexual experiences and to have the chance to access care or treatment faster due to the warning system. The regular or occasional messages encourage people to go for screening and testing. With these features, we try to tear down the stigmas and to cut the fear of STD or STI.

4. Efficiency

To maintain the core services, we need the mobile application, a server and developer keys for the Google and the iOS app store. For the next phase of CoitoCare, which is based on AI, we need a cloud or local GPU cluster for training the predictive models.

5. Reach & Extensibility

The software can handle not only HIV, but STD, STI or any other diseases or infections. It can be used worldwide, there is no limitation based on location. In the future, it can be extended with features like official third party certification for diseases by health centers.

II. CoitoCare

CoitoCare is an application for sexually active people to provide safety from sexually transmitted disease or infection by logging and backtracking intercourses and sending warnings in the case of present or potential danger while it provides anonymity for users. People can be safe since the service sends a warning message when a close contact reports any disease or when the service detects a possible threat by the user's settings and preferences. CoitoCare helps people to tell their previous sex-partners that they might be infected. Speaking about diseases and infection can be embarrassing and awkward. However, a responsible person always tell the risks for their partner even if that the risk of getting disease or infection is really low. But what if, than the former partner is unknown? CoitoCare helps to manage a situation like that. 15 seconds after the sexual intercourse is enough to store the data in our application. This is a very short time, but it could prevent being infected or to avoid for infecting others.

1. Vision

Our vision is to provide a safer world to sexually active people where they get immediate notifications and warnings about being potentially infected. With our solution we can help to lower the spreading speed of diseases or help people to avoid being infected. This software is useful to anybody without the type and openness of their relationship. So our user can be either a couple in a monogamous relationship, a single person, who is dedicated into one night stands, or a bunch of people who like to have orgies or swingers. Everybody deserves the free and good sexual experiences without fear of diseases. Sexuality is part of daily life, so we don't want to rule these intercourses, we want to catch diseases and infections faster than it would be without our application.

2. Uniqueness

2.1. Contact tracing apps

This is not a yet-another contact-tracing app, since those apps find contacts based on the closeness of location and reports only the close findings. CoitoCare searches for contacts based on the fact of sexual intercourse that was verified by the affected people. It searches not only in the close contacts to provide extra safety. The searching algorithm goes deeper and sends potential warnings even if the close contact does not report any disease. Let's say, we have three people: Alice, Bob, Charlie: Alice and Bob spend a night together. They verified the sexual activity with CoitoCare. After the goodbye, Bob drives to Charlie to have some fun. They also set the fact of sex in CoitoCare application. When Bob reports any disease, we inform Alice and Charlie about being potentially infected and ask them to go to the doctor. However, if Bob does not report disease, but Alice confirms her infected status, we send a warning message to Bob and Charlie. All warnings are anonymized. CoitoCare never tells who was the source since it is more important to have a better treatment than make conflicts between earlier partners by revealing this information. However, if a user has only one sexual partner, they will know the source. Such as it is in real life. If somebody has a monogamous relationship and they get a sexually transmitted disease from their partner, they know who is the source. It comes from the nature of network hierarchy like sexual intercourses or any other interpersonal relations. Besides the reported warnings, CoitoCare sends messages if a user is in more danger by a new trend in sexual activities. For example, Diana sets the gender and sexual orientation parameters in the CoitoCare app and the service see, there are a lot of new infections between people within the same groups. In this case we warn Diana about the new potential risk. This can help prevent Diana from being infected and it can help to slow down the spread of the new disease.

We use infection and disease instead of sexually transmitted disease since the application can handle not only STD's but any other diseases.

2.2. Sex tracker apps

CoitoCare does not collect information about the details of sexual activities. We do not care about the gender of affected partners, the duration, the place or the used poses. From the view of STD or STI the only necessary data is the fact of sexual intercourse, the level of protection and the ID of affected partners. The name or the sexual preferences of any involved person is not important. So the main function of CoitoCare is to build a network based on sexual intercourses and to maintain that chain. When a new disease or infection is reported in the network, the application sends warning messages to the user who potentially are in danger. The main focus of our application is to help people be in safe instead of building self-esteem based on sex-history.

3. Limitation

The application runs on smartphones or tablets. The first version of the application is made under Android. For using the service, the user has to have a smartphone or tablet with Android operating system. Furthermore, it is really advised to have network connection such as WiFi or mobile data, that can be for example GPRS, EDGE, HSDPA, 3G, 4G, 5G. The application uses light data packages to share the data of matches with the servers. In this view, there are no minimum requirements for the bandwidth of network connection. For installing and updating the application it is advised to use Wi-Fi, but it is also not mandatory. Application can be used in offline mode, but the warning system, which is the greatest advantage, works online due to uploaded match data and the fully built network for sexual connections are needed for the predictions and warnings.

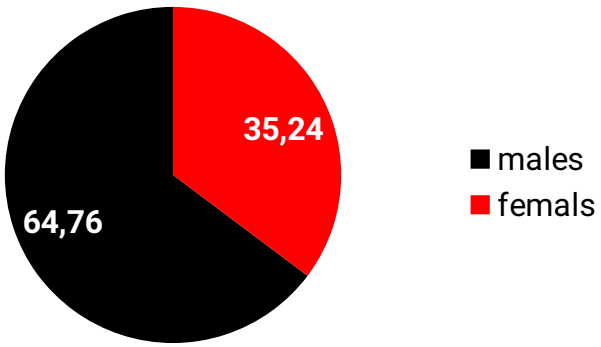
III. The Background of the Problem

The background of the problem has two main parts. First is connected to the spreading of diseases and the number of people who live with STD or STI. One of the most known disease is HIV, but this is not the only one who threats people. The second component comes from bad knowledge and the lack of understanding. People always afraid of that they don't know. Being infected in some case can be prevent by protection during sex.

1. Numbers

According to the EU or the WHO, a lot of new HIV infection occur year by year. Nearly 2 million people is infected with HIV yearly around the globe. In spite of the great numbers, the data processing and public information process are slow. On the WHO's site, the latest real data come from 2018. The data for 2019 year is only prediction. EU is a little faster, since the latest data comes from 2019 and it was processed in 2020. The data can be tricky, since usually the new public information pop out at the end of the year. So we should have wait for the 2020 data at least the fourth quarter of 2021.

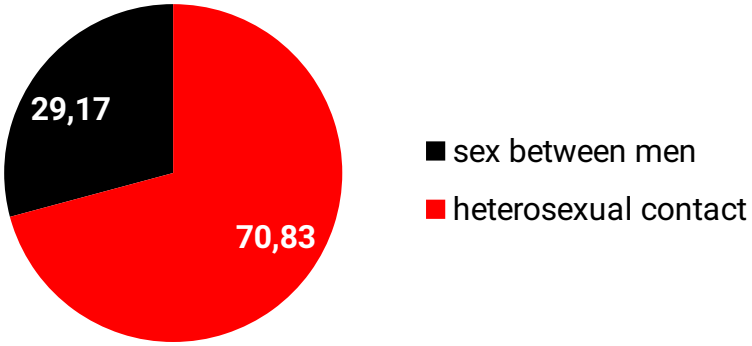
According to EU, 55% of infected people are diagnosed late, when the cell count is smaller than 350 per mm3. This data is related the EU and EEA region where the public health services are better than in the developed world. CoitoCare can help to handle this situation since when a new disease is reported, we send messages to the affected users. In this case an affected user does not mean a user in close contact who have slept with the diseased person, but a deeper connection for example who slept someone who slept with the diseased person. The same document contains table about the number of new infections. Only in the WHO European region there was 136.449 new HIV cases in 2019.



2. Knowledge

There are researches that examine how the disease spread within a distinct population. People usually say, HIV is related to men who sex with men such as this article shows the symptoms of this social problem. Despite homophobia, this has other huge negative effects like the false sense of safety for heterosexual people. Some paper, for example from PubMed, CDC, NCBI, does not facilitates the situation since they collect STD or STI data from men who sex with men.

In the EU's latest HIV surveillance report, the ratio of getting infection by heterosexual relationship increases over getting infection by sex men with men relationship. In 2019 in the WHO European region only, the ratio of infections from the transmission sex between men and from heterosexual contact were 29,17% and 70,83%.



HRC collects a lot of myths about HIV like "I am over 50! I don't need to worry about HIV.", "I am in a monogamous relationship. I don't have to worry about HIV." or "You cannot get HIV from oral sex.". However, CoitoCare has no chance to destroy myths, we can warn people who are in a possible dangerous situation.

IV. The Business Idea

1. Persona

The persona of CoitoCare is not a single group of users since the main characteristic of our potential user is who is sexually active. It is an attribute for most of the world's mature population. There is more interesting how many subgroups can be created to identify different needs and use-cases. In this scope, sexual attraction does not matter. So the user can be hetero- or homo- or any other sexual.

Form of relationship:

- monogamy
  - classical: one person only
  - serial: always the same one person at a time
- poligamy
  - classical: same people only
  - serial: more people from a strict group at a time
  - open: strange people

The motivation of sexual intercourse:

- fun or joy
- work
- childbirth
- other

Number of sexual partners at the same time:

- one
- more

Why is this classification so important? In an ideal world, the dyadic relationships are reflected, so if the partners have a consensus in living in a classical monogamy, they live by those rules. Real life is more complicated and being safe from STD is not equal with for example living in a classical monogamy. However, those different groups above need different approaches. In the future the application has to be ready to be comfortable for anyone. The large number of potential customers always leads to some level of discomfort. There are people who feel offended by seeing there are people who identify themselves differently. Some people prefer monogamy over polygamy, some thinks differently. Others like to watch porn, but do not care about the health of actors. Actor means in this case male, female and other gender at the same time. Some people want to have sex after the marriage, some not. Sexuality is part of daily life, but people think about it really differently. We want to create an app that tries to be liked by the most people and try to repel as few people as possible. This is not an easy goal, that's why we tried to classify our potential users. In real life there is no absolute risk-free sexual intercourse. The ratio can be lowered to nearly zero, but absolutely zero percent is not available. That's why it is so important to store each sexual contact.

There are people who have sex as work. They can be porn actors or sexual workers. We know, it can be hard to confirm a sexual intercourse with a sexual worker, but being healthy may be more important than our moral viewpoints. They are human also, and they are in danger more due to the huge number of daily sexual interactions. We have to save each other. And we think, if these people share an intimate moment with each other, they have some responsibility for the partner. Even if that the moment was about just sex without any emotion. Porn actors are also vulnerable due they have sex within a small group of people. If any of their colleagues is infected, they have to be warned immediately. However, they sign contracts and their intercourses can be tracked by the studios and producers, using an application is more comfortable and easy than reading tables and time schedules.

2. Use Cases

There are two main use cases. First is when two people are involved in the sexual intercourse. Second is when more than two people are affected like a swinger or sex party. Of course, a group sex can be divided into a distinct number of dyadic sexual activities.

CoitoCare can handle both use cases with the same method. The first step is that each participant creates a match which is how CoitoCare maps of real sexual events. The next part when all participants read each others QR codes. If only two people are involved, the reading sequence is easy, If more than two people are involved, everybody has to read the QR code of who have has sex with. This method provides the flexibility. Imagine a swinger event, where 6 people are invited. This does not mean that everybody has sex with others. If one person has sex with 5 people, they will read each others QR code. If a second person has sex with 2 others, they will read two codes only.

3. Business Model Canvas

We made a full business model canvas to show our idea is good, feasible and sustainable.

3.1. Key Partners

- **Users**

  Users equals the persona of CoitoCare. Since the quality of our service hugely depends on the data that our users provide, they are the most key partner.

- **Care Facilities**

  Any facilities that provides caring services for people who are living with HIV or with any other STD or STI. We can help our user to find a proper and near facility.

- **Counseling facilities**

  Any facilities that provides counseling services for people who are living with HIV or with any other STD or STI. We can help our user to find a proper and near facility.

- **Internet Service Provider**

  ISP supports the skeleton of our core services. We can get and send data via internet so without an ISP, we cannot provide any service.

- **LGBTQ communities**

  Communities are really important, since they can help us to follow the trends. With their support we can upgrade our services better that fit well for people. We want to maintain a service that not for only the majority, but for minorities as well. There are a lot of groups within the umbrella of LGBTQ communities and we think, a good service try to cover as needs as possible.

- ***Testing facilities***

  In the future we want to establish a cooperation between our infected users and testing facilities to provide better care for our users.

3.2. Key Activities

- **Record the fact of sexual events**

  The base activity is recording sexual events. Our services depends on this step. If users store the data each time after a sexual intercourse, we have the chance to identify the spreading of disease as soon as possible.

- **Get warning about being potentially infected or being in danger**

  Every coins has two sides. Storing data is the first side and getting warning is the other side of that coin. We try to provide a good tradeoff between collecting data about sexual activities and providing proper warnings and notifications. This activity is connected to our value propositions.

- **Store disease status**

  The third key activity is storing disease status. It help us to send warnings. This step is less embarrassing or awkward than tell it to face to face. We hope, people always tell their disease status for former partners in real life. However, there is a chance especially after a one night stand, that the former partner remains unknown or they are unavailable.. This activity help our user to tell the disease state without revealing their own identity, since our service send warning, but never attached the source name or id to that message.

3.3. Key Resources

- **Data about sexual activities with the affected people**

  Without these data, we cannot create warnings and predictions.

- **Descriptions of diseases, diagnostics and treatments**

  These information help us create better predictions and send more precise warning message. For example, in the future, we would like to help our user to connect them with testing facilities or care facilities. For this step, we should know what are the most common treatments of a specific disease.

3.4. Value Propositions

- **Warning system by multi-level predictions**

  Normal contact tracer apps work based on the relative closeness of users' devices that is measured via bluetooth or set up manually. Setting up manually is usually not so reliable since it has no necessary to validate by the other user. Due to the spreading nature of any STD or STI, a relative closeness of users does not matter, only the fact of sexual intercourses. However, infection can occur without symptoms, so a second or third connection can be vulnerable. We calculate only based on the approved sexual interactions, but not necessarily on the first level connections.

- **Tell easily to former sex-partners about they could get infected**

  Telling to former sex partners, they might be infected is really embarrassing, hard or impossible. Imagine if the partners don't know each other, just spent some time together. We can notify a regular partner, a one-might-stand or a member of a group sex as well. The only thing is matter for our network and warning system is the sexual intercourse has to be confirmed.

- **Anonymous system**

  Users are anonymized, they don't share real name with each other. They can store a nick, but this is only for to make our notification more personalized. In server side each user has unique ID, but we do not collect real name, address, birth date or family data. These are not relevant in our system yet.

- **Only the necessary data is handled**

  Only the necessary data is stored and the users have the chance to store optionally data if they want to. Prediction works if the gender and sexual orientation is stored, but the app still remain usable without parameters as well. So within the app users remain anonymous and we handle only the necessary data on a HIPAA and GDPR compatible way.

- **Easy to use**

  CoitoCare is very easy-to-use, setting up a sexual event costs 3 steps and less than 15 seconds. It is shorter than lighting a cigarette after sex or making a coffee. But using CoitoCare is much healthier of course. First step is creating a new match which means the fact of a sexual intercourse. After it comes to set the protection details like condom, PrEP or PEP. Finally, the user has to add partners. The number of people to add is not limited. So our software fits well for a classical two people sex or a bigger party as well.

- ***Get connected with testing facilities***

  This is a value proposition for the near future. We want to help the user to find testing facilities near their location. It also help to establish direct connection between facilities and patients if it is approved by the local or regional legal systems.

- ***Disease-status can be confirmed by third party testing facilities***

  We want to provide the possibility of confirmation the disease status by third party facilities. This can help to build much more trust between the users and it encourages people to go for screening and testing.

3.5. Customer Relationships

- **Self-service**

  Users can use our app anytime and anywhere to add new match events or set disease state.

- **Automated notifications**

  When our system detects vulnerability for a unique user, we send automatic message to them. This can be based on network property for example a close or distance but relevant connection get an infection or it can be predicted based on the occurrences of disease in the network.

3.6. Channels

- **Application**

  Our services available via application. N this time we provide Android apps, but in the future we want to move to iOS platform as well.

- ***REST API***

  In the future we provide REST API services to our facilities partners.

3.7. Customer Segments

- **Sexually active person**

  Our main customers are the sexually active people. This group are equals with the users from the key partners section.

- ***Testing facilities***

  In the future we want to establish a cooperation between our infected users and testing facilities to provide better care for our users.

3.8. Cost Structure

- **Fixed costs**

  Our costs structure is quite easily structured, since our costs are mostly fixed costs like server, internet service, salaries, other costs of maintenance. We provide our services via internet to our users. However, for a good user experience, we should monitor the bandwith/user ratio and the servers' process/user ratio. If these are low, we should implement a new server. A new server has costs, but from that point, that costs exists as a fixed costs as well. So basically there is no unique and variable costs that occur when a new user joins to CoitoCare.

3.9. Revenue Streams

Revenue streams really depend on the selected economical form. We can imagine our solution as a startup or a foundation as well. Both of them already exist in the software industry. That's why incomes could come from money investment, medical and healthcare advertisements or donations. Each of them is a valid strategy. We do not want to maintain a whole office and staff to cut the costs as possible. Since most of the costs are fixed costs, the whole idea can start with a bigger investment and a very little monthly income. We are open to license our code as open source or copyrighted too. So this is a highly scalable idea that fits for any kind of investors.

- **Donations**

  Donations can be of the main pillar of budget. Donations is really fluctuate, it can compare the lack of ads. If this model will be chosen as the main strategy. However, it can work with placing ads as well.

- **Advertisements**

  It can be made profit by placing ads in the app. If this road will be chosen, we would like to place relevant ads from healthcare industry.

V. The concept

1. Name

The name of CoitoCare comes from the words coitus and care. Coitus means sexual intercourse and care means to look after or protection of someone.

2. Design

Since the pronunciation of CoitoCare is like a Japanese word, we used color that are connected to Japan: white, black and red.

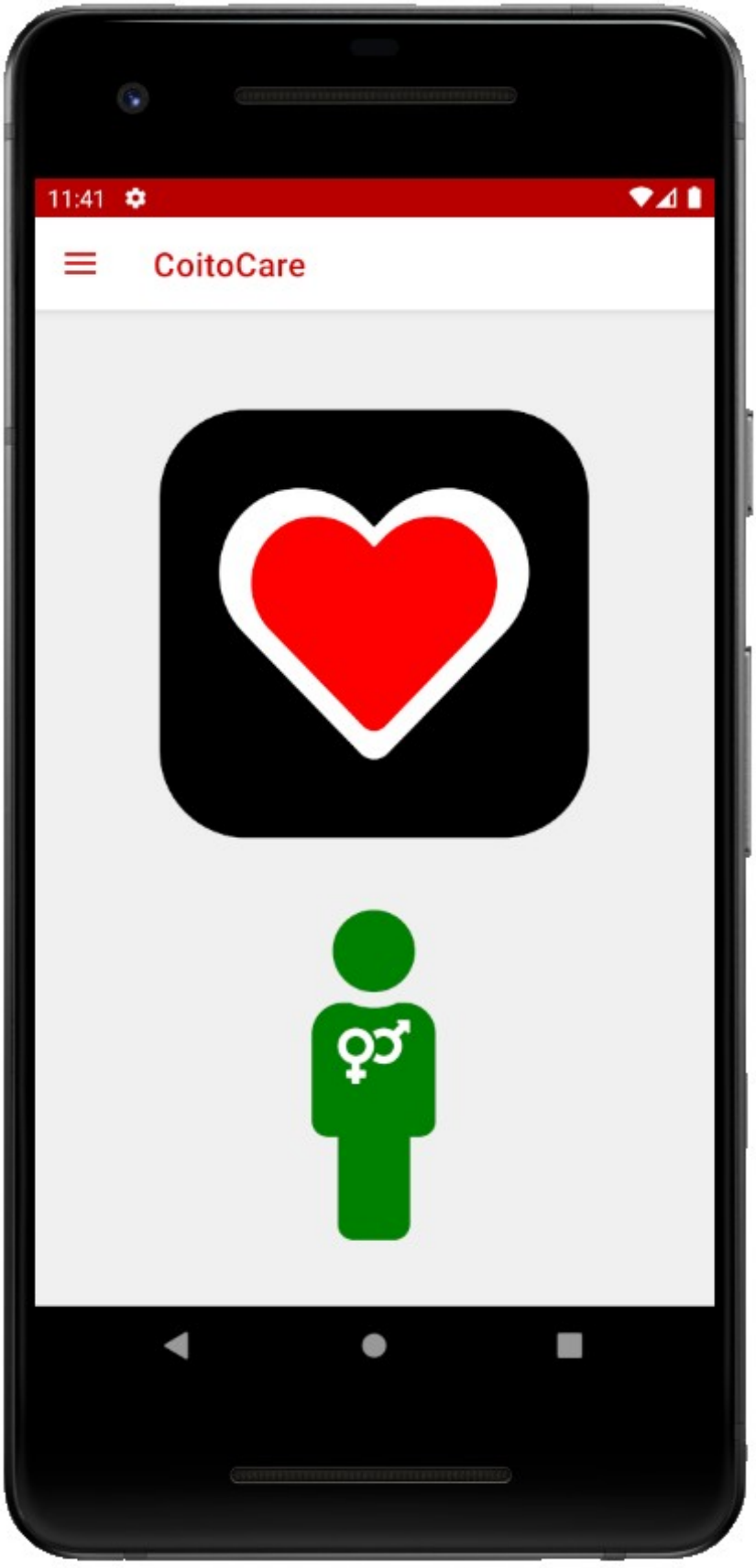
	Name	Color	R	G	B
1	white		0	0	0
2	black		255	255	255
3	red		255	0	0

3. Logo

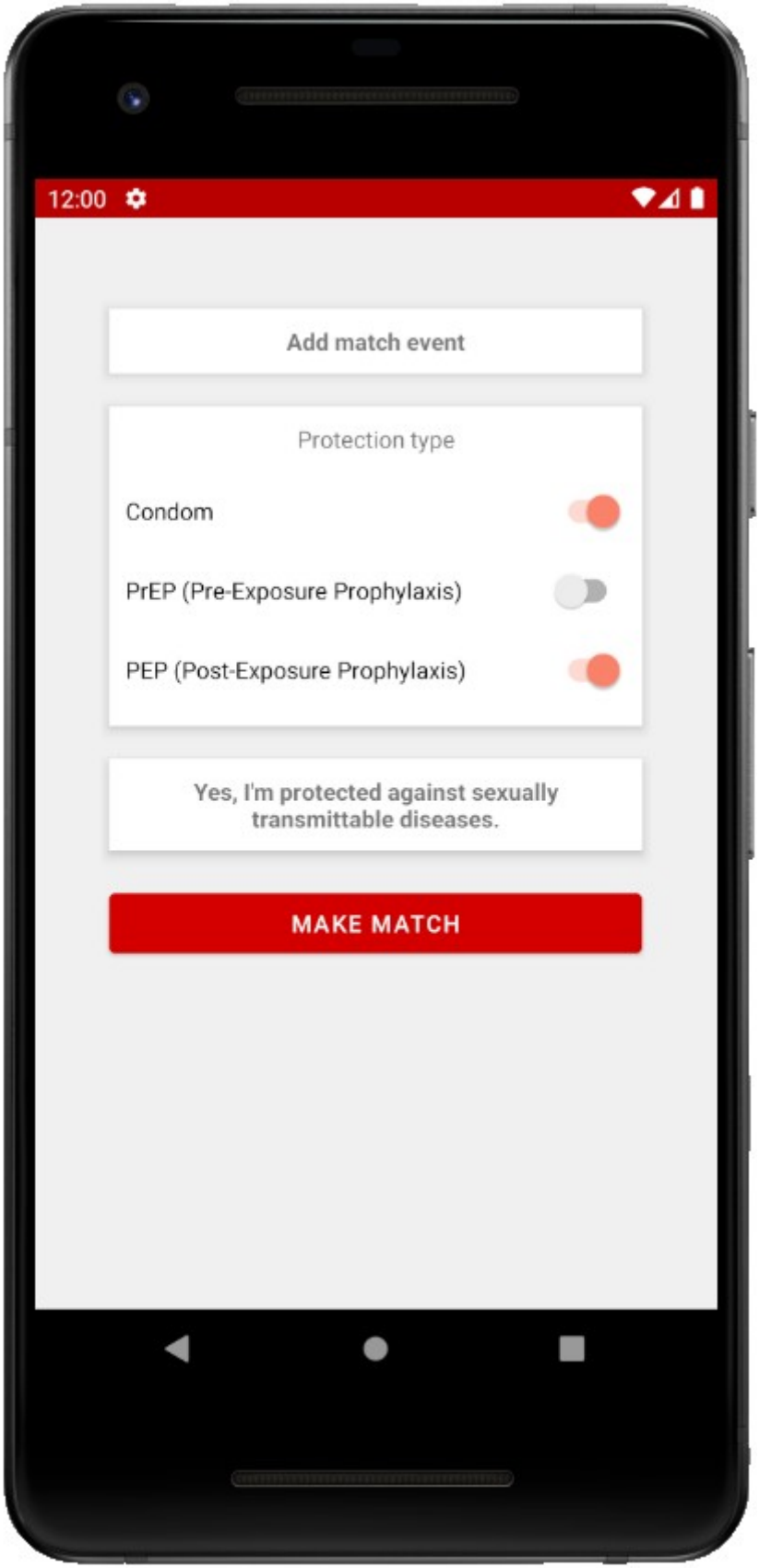
The logo contains two “C” letters where one of them is vertically flipped. Between the C letters there is a shield. The background of logo is a red plate. Since the application is connected to sexual activities, we tried to make something funny and sexy,. The first look of the logo is really natural, but in the context of sexual activity, people with vivid imagination can see the logo as a paraphrase of human genitals. This kind of sensuality helps people to be bounded with the app. After a sexual intercourse, people think more likely about erotic or nasty things, so an application with an ambiguous logo can refers to users’ state of mind.

VI. Application Design

1. Main Activity

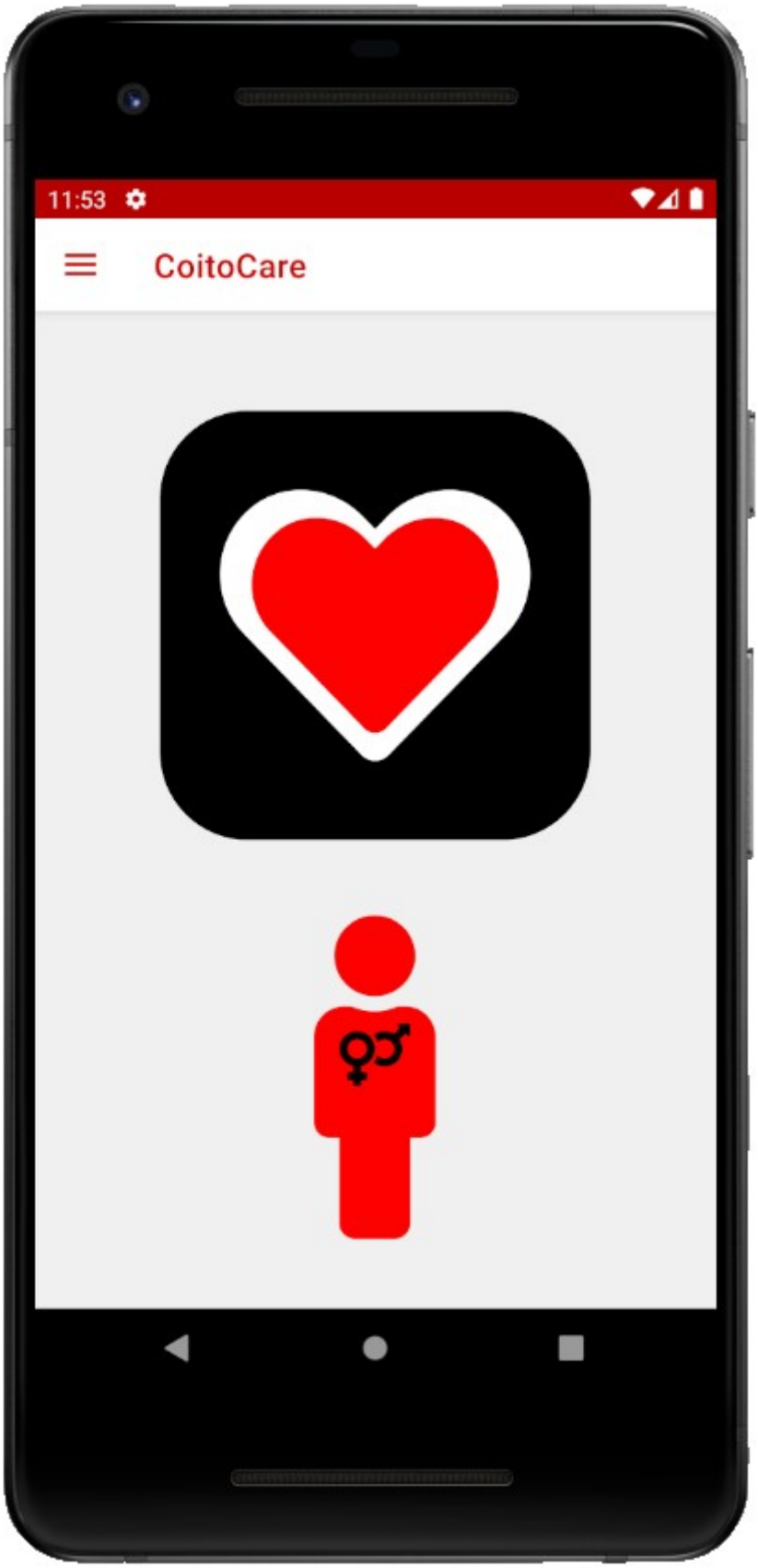


2. Match Event

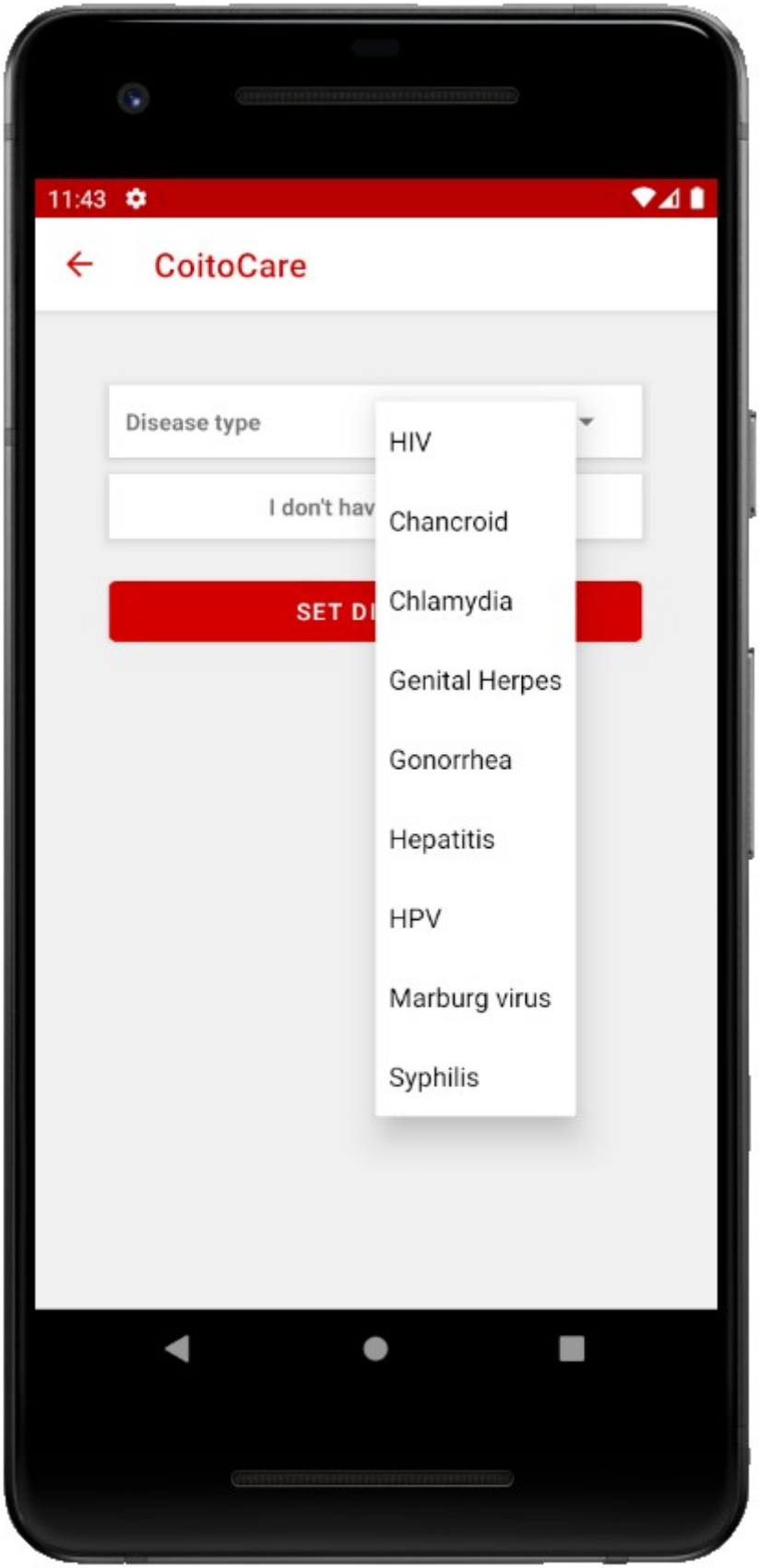


3. Make Match

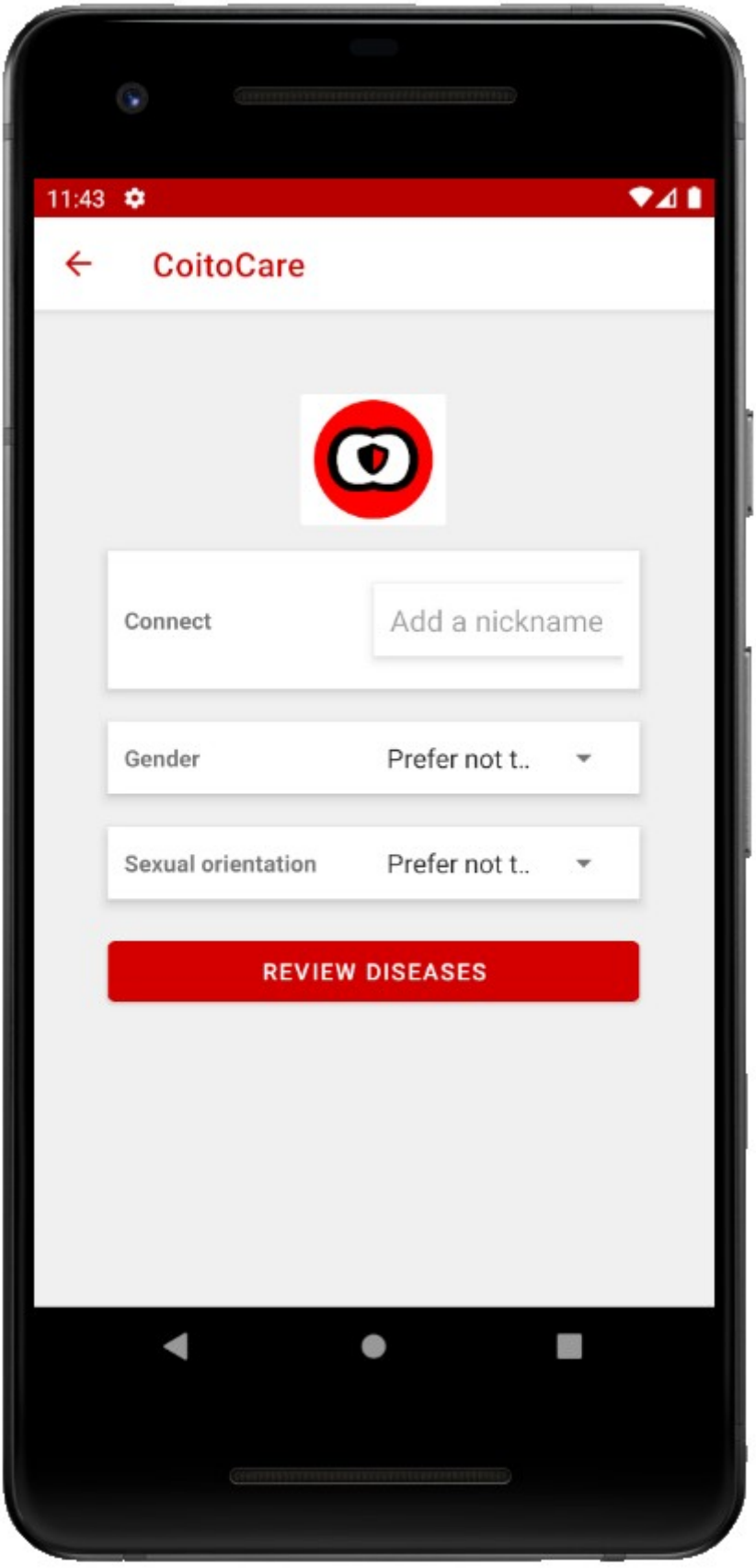
4. Warning



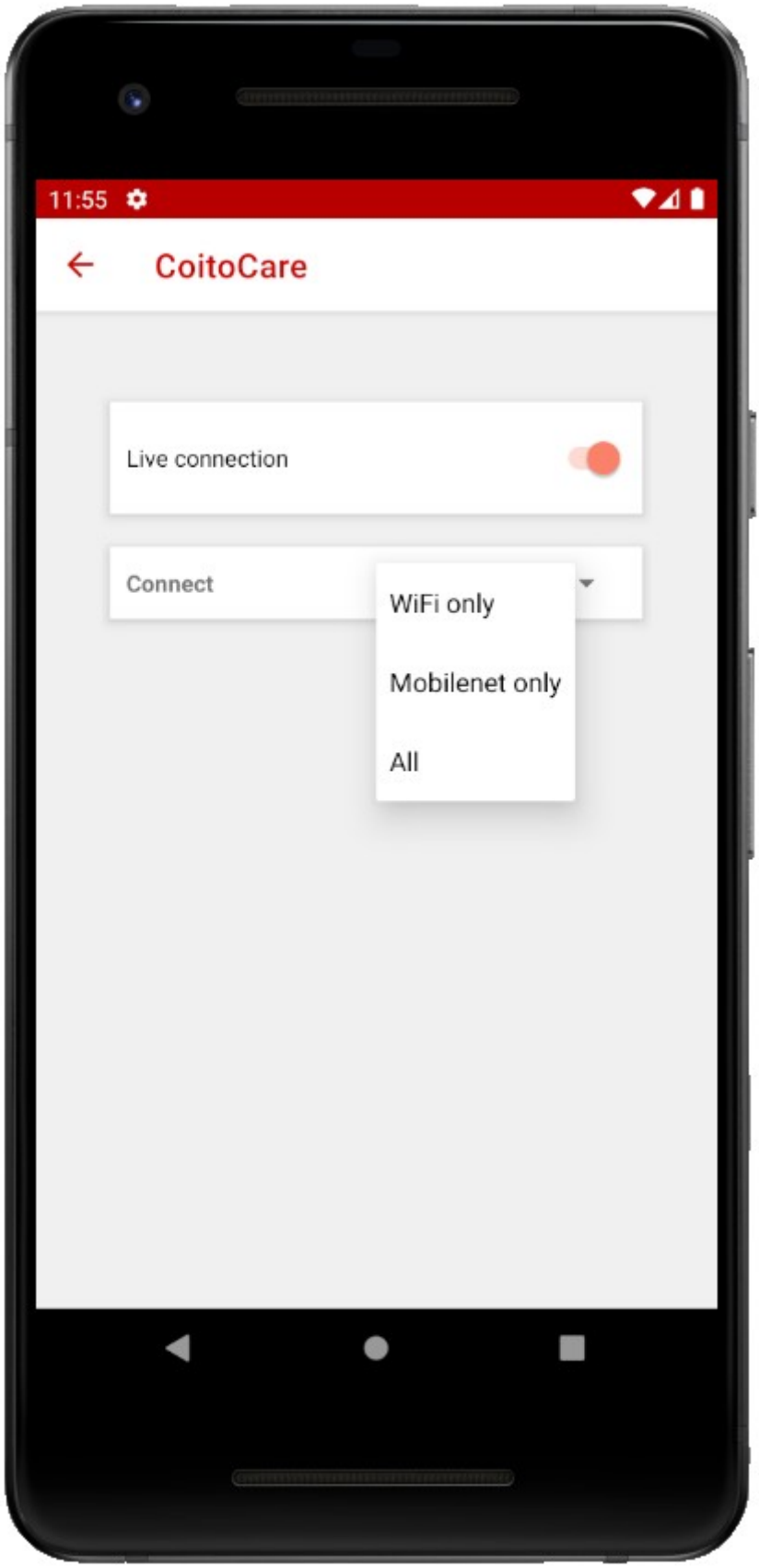
5. Disease


11:43
CoitoCare
Disease type
I don't hav
SET D
HIV
Chancroid
Chlamydia
Genital Herpes
Gonorrhea
Hepatitis
HPV
Marburg virus
Syphilis

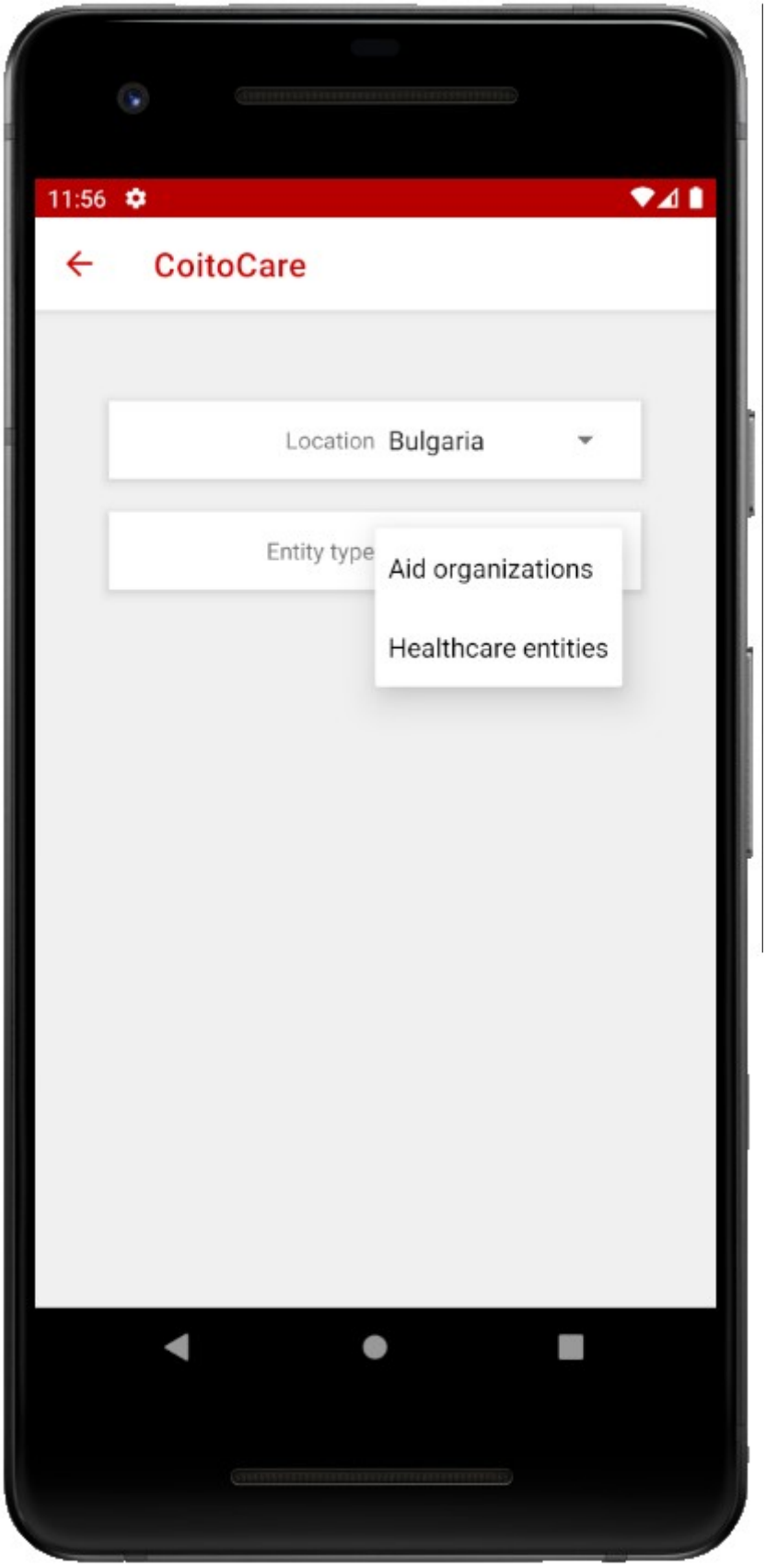
6. Profile


11:43
CoitoCare
Connect
Add a nickname
Gender
Prefer not t..
Sexual orientation
Prefer not t..
REVIEW DISEASES

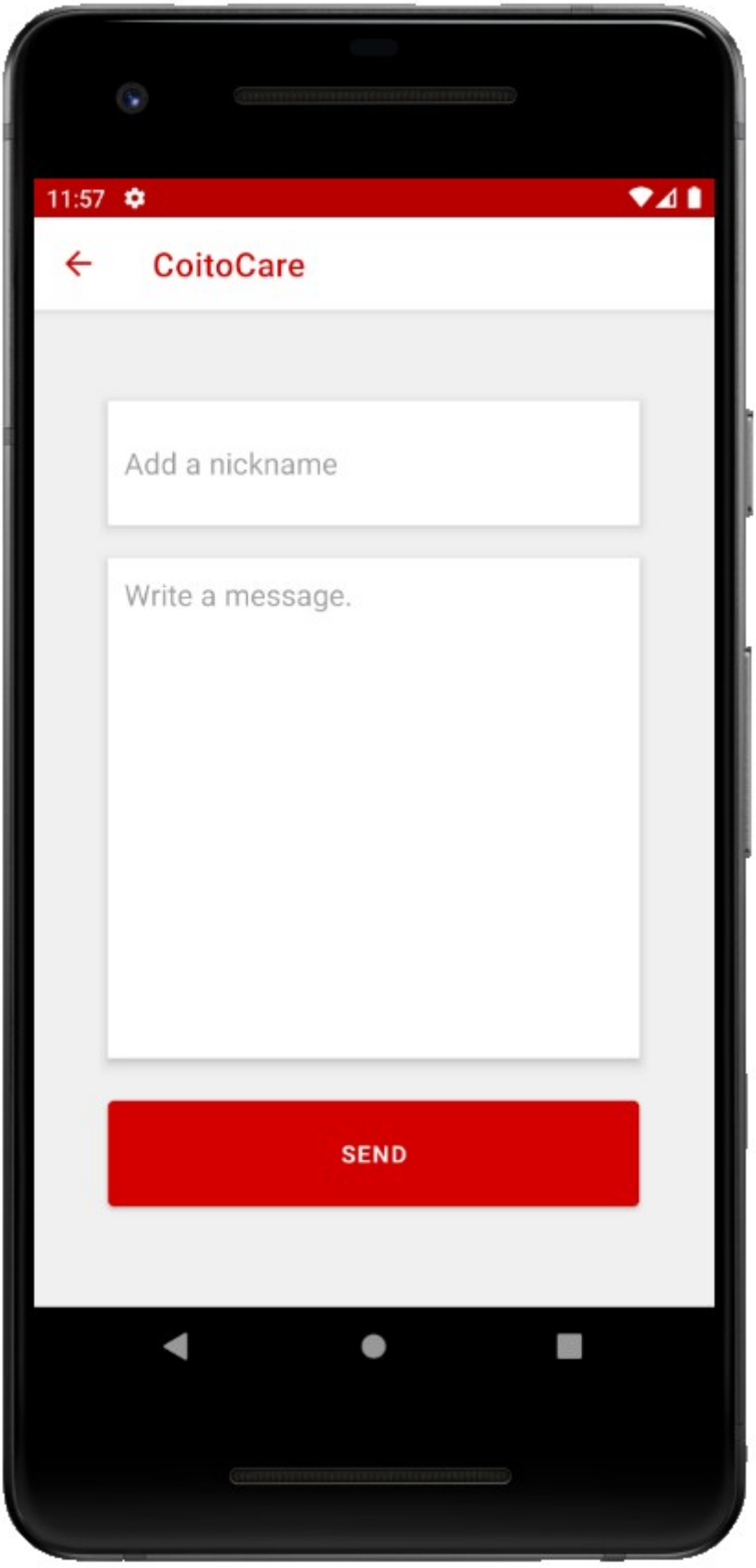
7. Settings


11:55
CoitoCare
Live connection
Connect
WiFi only
Mobilenet only
All

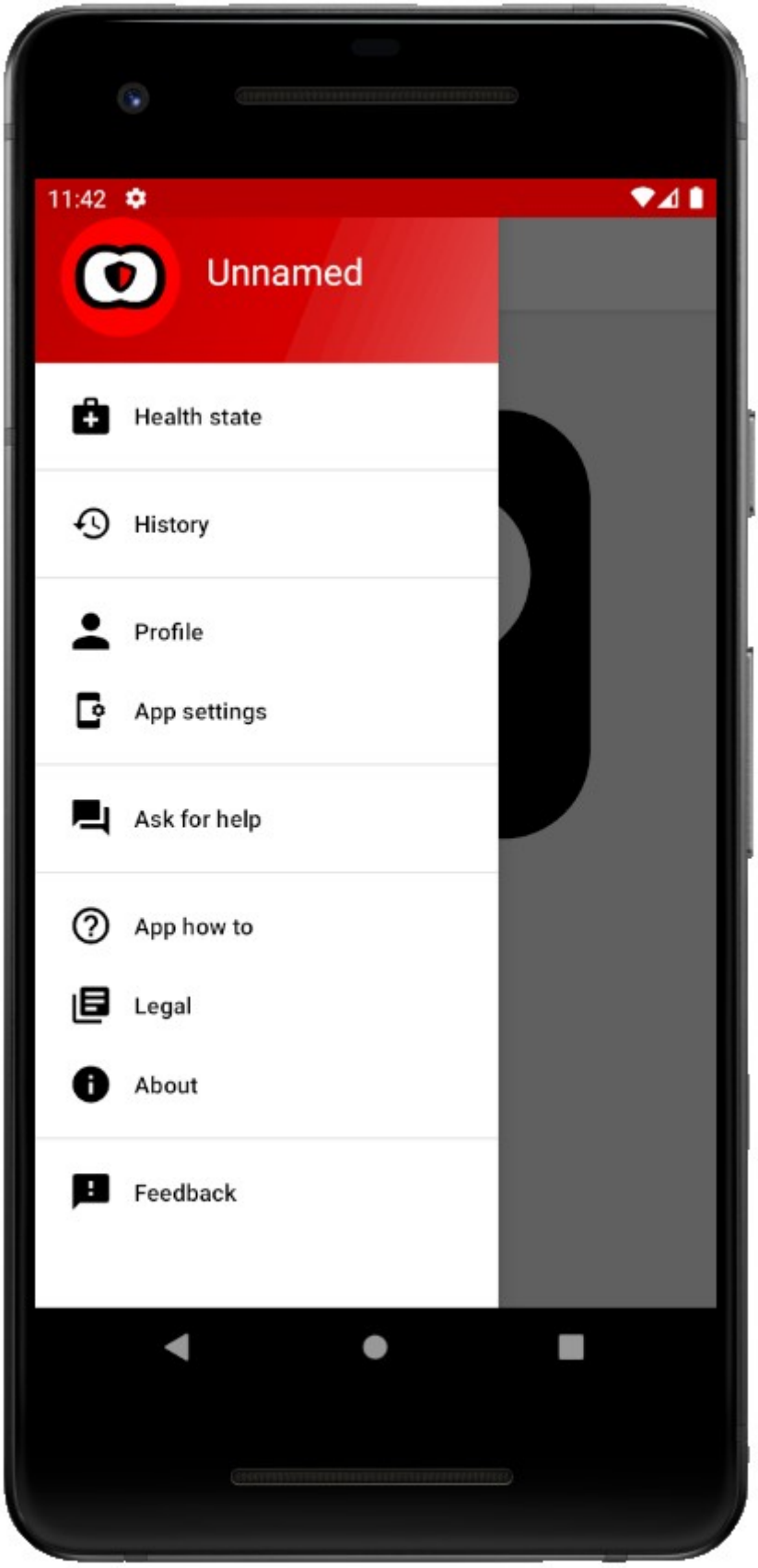
8. Entity


11:56
CoitoCare
Location
Bulgaria
Entity type
Aid organizations
Healthcare entities

9. Feedback



10. Navigation Drawer



VII. Data

We try to minimize the number of handled data. There are some special data that provides better personalization or better user experiences. This kind of data are always optional. From the viewpoint of relation between user and data, we created three different classes:

- **I**: input, when the function of data is to store value, but this is not will be shown on the screen. For example: timestamp of created data
- **O**: output, when the content of data is fix, the user has no permission to modify it. For example: EULA
- **IO**: input and output, when user has the permission to modify it and the content of data will be shown on the screen. For example: disease, nick

On the application side, we handle the following data.

- *Connection data*:
  - **live_connection** : bool [IO]

    Live connection means that the application works in online or offline mode. Online mode is necessary to get warnings.

  - **data_transfer** : int [IO]

    Data transfer refers to the selected channel for any data transmission. This can be Wi-Fi only, mobile data only, or both. Data transfer will be allowed only on the selected channel.

- *User data:*
  - **nick** : char(256) [IO]

    This is an optional data for the personalized warnings. It is better when the messages begins with the proper naming. It can be real name, nick name or any other word that suits for the user's need. If it is empty, we use the default message header.

  - **gender** : int [IO]

    The gender of the user. It is an optional data for the potential warning system and for statistical reasons. We do not care or monitor whether the user make sexual relationship fits for this settings, since it is used only for prediction of the potential vulnerability of user. For example, when a new disease occurs within a group that use the same settings as the user, we can send warning message to the user immediately. So it is really advised to set this parameter properly, but this is not a mandatory data. The user can choose the most suitable value from a strict list. The list can be updated by users' feedback. We try to add as many details as possible from the start, but there are a lot of option around the world. We do not want to force the user to change a non-suitable settings. We support, that a proper settings can be the tool of self-expression, but for statistical reasoning, a unique category is quite contra productive, since there are no other match in the network to predict the vulnerability. That' why we implemented the "other" category. We really encourage our user to choose a proper category or make a new discussion about potential categories with the society and/or LGBTQ groups. However, we are developers and not sociologist, we are open to any new idea that is supported by the majority of affected community.

  - **orientation** : int [IO]

    Sexual orientation of the user. It is an optional data for the potential warning system and for statistical reasons. We do not care or monitor whether the user make sexual relationship fits for this settings, since it is used only for prediction of the potential vulnerability of user. For example, when a new disease occurs

within a group that use the same settings as the user, we can send warning message to the user immediately. So it is really advised to set this parameter properly, but this is not a mandatory data. he user can choose the most suitable value from a strict list. The list can be updated by users' feedback. We try to add as many details as possible from the start, but there are a lot of option around the world. We do not want to force the user to change a non-suitable settings. We support, that a proper settings can be the tool of self-expression, but for statistical reasoning, a unique category is quite contra productive, since there are no other match in the network to predict the vulnerability. That' why we implemented the "other" category. We really encourage our user to choose a proper category or make a new discussion about potential categories with the society and/or LGBTQ groups. However, we are developers and not sociologist, we are open to any new idea that is supported by the majority of affected community.

- **photo** : binary [IO]

  A photo about user or about a favorite object. This is optional to make a personalized environment for the user.

- *Disease data:*

  - **created** : int [I]

    The date when the disease data is created. The int values refers to a timestamp.

  - **start** : int [IO]

    This is the date when the disease is begun or detected. Mostly this can be the time of adding the new disease into the application by the user, or the time of confirmed positive test.

- **disease** : int [IO]

  The name of the disease. The value is integer since disease can be chosen from a strict list. The list is updated regularly. Why we use a strict list? We do not want to spam the system diseases or mostly symptoms that are not infectious for example headache. A chronic neck or back pain can be bad for the user, but fortunately these kind of disease cannot be transferred during sexual activities.

- **end** : int [IO]

  End date of the disease. This can be the time of a confirmed negative test or when the user feel the last symptom.

- *Match data:*

  - **created** : int [IO]

    Time when the match is created.

  - **match_id** : int [I]

    A unique identifier for matches. Uniqueness occurs only on user-level. On the system-level there can be matches with the same idenifier.

  - **closed** : int [IO]

    Time when the match event is closed.

- *Matches data:*

  - **created** : int [I]

    Time when the match event is created.

  - **match_id** : int [I]

    A unique identifier for matches. Uniqueness occurs only on user-level. On the system-level there can be matches with the same identifier. This is the same as a mach_id in the match data section.

- **other_user_id** : int [IO]

  Identifier of the other affected user who was involved in the sexual intercourse. In that case when more than two people were in the sexual event, this table contains as rows as necessary.

- **other_match_id** : int [I]

  The unique identifier for matches of the other affected user. Since uniqueness occurs only on user-level, it has a chance that match:_id and other_match_id are the same.